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AGRICULTURAL DEVELOPMENT AND POLICY
IN
GUATEMALA

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This report has been prepared for the Guatemalan Mission of the United States Agency for International Development. The authors assume full responsibility for its content and conclusions.

A.S.

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PREFACE

In November, 1968, the Guatemalan Mission of the United States Agency for International Development arranged for the authors of this report--all economists from Iowa State University--to prepare an analysis of the role of agriculture in the development of the Guatemalan economy. The study was organized and carried out in close cooperation with the AID mission. The Mission Director, Deane Hinton, contributed to the clarification of the objectives of the research and the establishment of working relationships with Guatemalan agencies. The government of Guatemala gave its full support to the project. Personnel from the Ministry of Agriculture, the National Planning Council and the Bank of Guatemala played key roles in the data collection and analysis.

Personnel

The active participation of many Guatemalan agencies was essential to the successful completion of the study. Specialists from these agencies were called upon to provide technical advice, background data on particular programs and insights on the problems and goals of the agricultural sector in Guatemala. Many of the specialists who provided information for the report will undoubtedly be involved in further analyses and the development of suggested programs. Their knowledge of the analytical strengths and weaknesses of the study and the reliability of the data should help them when using the report for such purposes.

The basic research team consisted of:

- (a) two persons from the National Planning Council; Mr. J. Victor Espada and Mr. Oscar Adolfo Diaz who, among other things, worked on the preparation of agricultural demand projections, population and employment projections, an inventory of agricultural development projects and helped with the construction of a series of capital flow charts;
- (b) three persons from the Ministry of Agriculture; Ing. Carlos H. Juarez who was responsible for compiling agricultural price and production data and worked on the basic analysis concerning agricultural investigation and extension; Mr. Miquel Angel Campos who worked on agricultural marketing problems and export controls; and Lic. Carlos F. Acevedo who assisted with the compiling of the 1964 Agricultural Census data and helped with the analysis of the agricultural credit data;
- (c) three persons from the Bank of Guatemala; Lic. Romulo Caballeros who was responsible for the preparation of supply projections for various agricultural commodities; Lic. Marco Antonio Aparicio who provided a series of charts analyzing agricultural credit; and Lic. Guillermo Schell who prepared an analysis of several of the major export crops;
- (d) Rafael Alvarez who provided statistical and computing support for the entire group and also was in charge of compiling most of the Agricultural Census data.

A number of other men worked particularly closely with the basic research group. Lic. Carlos H. Alpirez, Chief of Agricultural and Industrial Studies in the Bank of Guatemala and Lic. Rene Samayoa,

Chief of National Income Accounts in the same institution provided many useful suggestions and made it possible to carry out parts of the work in the Bank. Lic. Oscar de Leon Aragon, head of the National Planning Council, committed valuable resources under his control to the study. Lic. Jose Victor Velasquez, Head of the Planning Department of the Ministry of Agriculture, provided constant support and personal contact with the study group as well as many valuable insights for all concerned. Mr. Alphonse Chable, the Agricultural Development Officer for USAID/Guatemala, served as a continuous source of information and support for the study. Mr. Milton Lau of USAID/Guatemala, provided a great deal of technical advice and insights based on his many years of experience in working with the agricultural sector in Guatemala.

Data

In the initial data collection process, efforts were made to review all relevant sources of data on agriculture and agricultural development in Guatemala. Nearly all of the government ministries, various international agencies and numerous private organizations were contacted in this search. Most of the information and data used in the final study, however, can be attributed to a few key sources.

Much of the basic statistical data was supplied by the Bureau of Statistics. The preliminary tabulations of the Bureau's 1964 Agricultural Census are used as benchmarks for determining the extent to which the agricultural sector has changed since 1950. Most of the cost of production and price data originated in the Ministry of Agriculture. The Bank of Guatemala and the National Planning Council provided a good deal of published and unpublished material on the national income

accounts, credit, imports and exports. Substantial amounts of information were also drawn from technical reports that have been prepared in recent years for USAID/Guatemala, FAO and other international agencies.

Much of the statistical data compiled for this study does not appear in the final report. However, a statistical handbook on the agricultural sector based on this material is being prepared by the Ministry of Agriculture and the National Planning Council and should be available in the near future.

CHAPTER 1

GUATEMALAN GEOGRAPHY AND POPULATION¹

1.1. General Characteristics

Guatemala lies just south of the Yucatan Peninsula in Central America. It is bounded on the north and west by Mexico, on the east by Belize, to the south and east by Honduras and El Salvador and on the southwest by the Pacific Ocean. (See Figure 1.1.)

1.1.1. Geography²

Although Guatemala contains only 108,889 square kilometers, approximately the size of the state of Louisiana, it has a very wide geographical diversity. In this land area are included high mountain ranges, coastal plains, high plateaus, tropical jungle and a very dry, almost desert, zone. (Figure 1.2.) There are numerous volcanos, some still active, strung along the Pacific Coast. The variety of geographic areas combined with a wide range of climates and soil types provide adequate conditions for the production of almost any agricultural product.

¹ Much of the information contained in this chapter is intended for readers not familiar with Guatemala. Sections 1.1.5 and 1.2.6 through 1.3.3 are basic to analyses in later chapters.

² More detailed descriptions of the geography of Guatemala can be found in: Whetten, N. L., Guatemala--The Land and the People, Yale University Press, New Haven, 1961; and Cohen, Alan; Economic Development in Guatemala, unpublished manuscript, USAID/Guatemala.

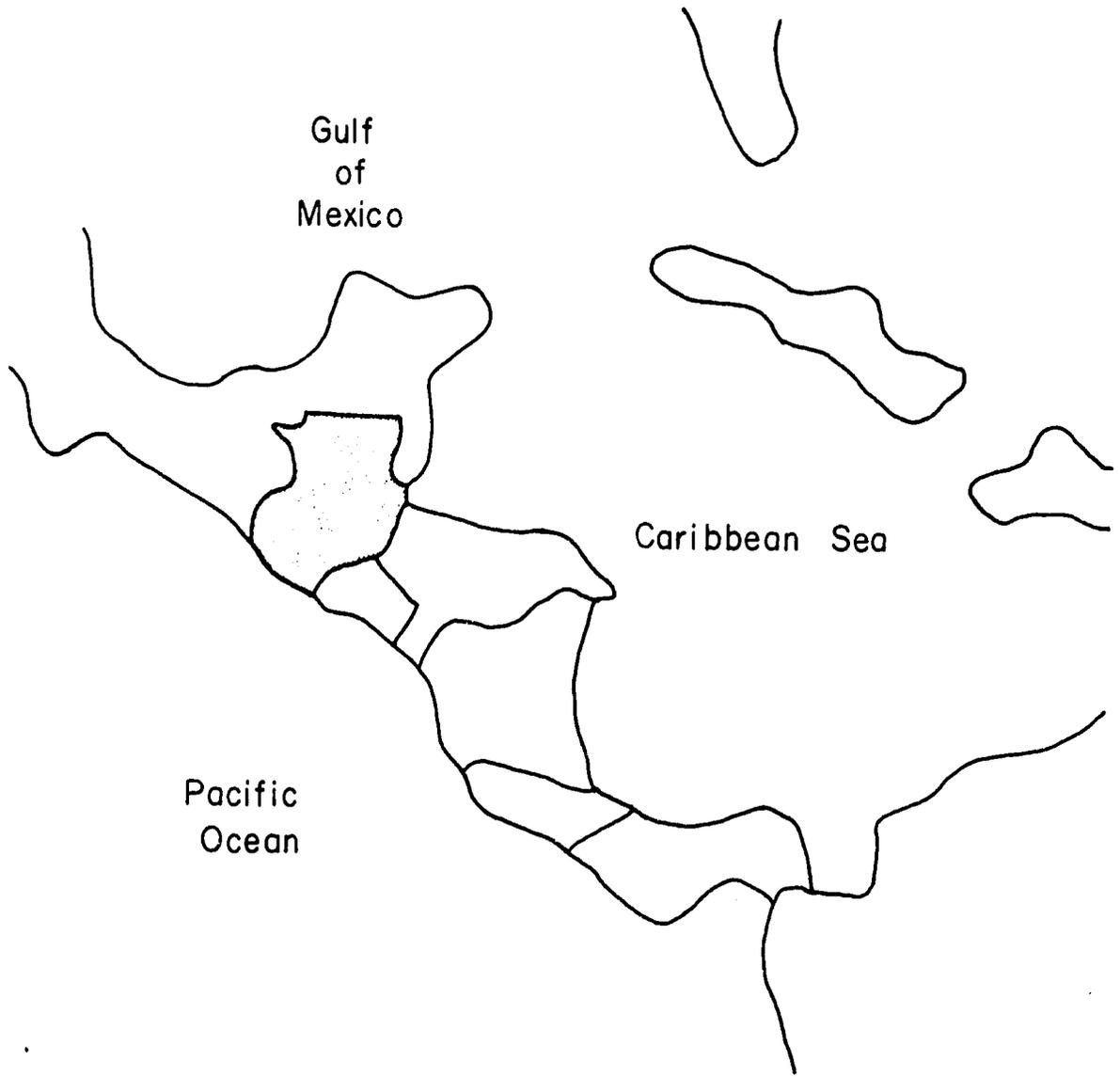


Figure 1.1 Guatemala - Geographic Location

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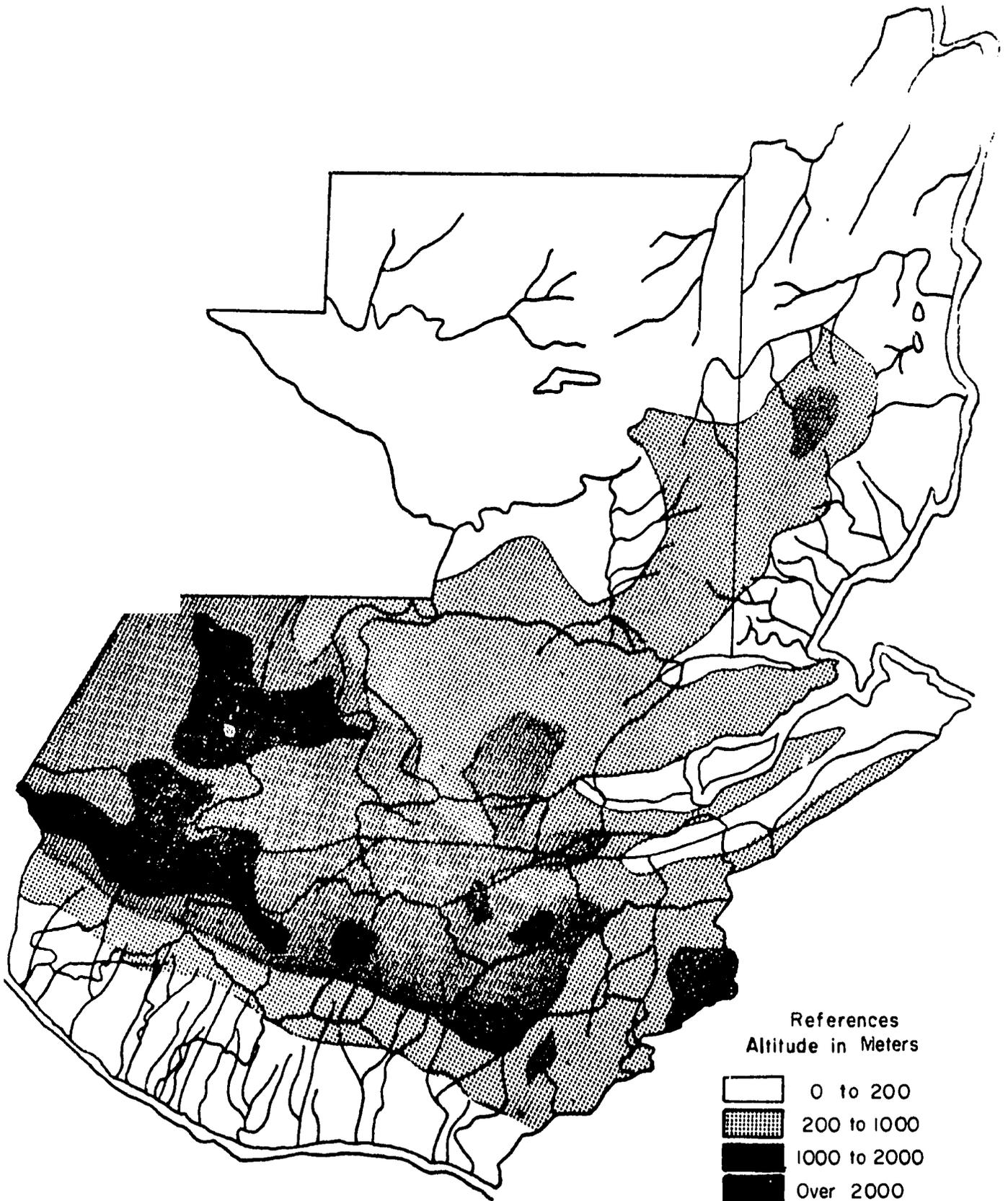


Figure 1.2 Guatemala--Natural Features

* Source: Statistics Bureau

The Pacific Coast Plain, a strip ranging from twenty to forty miles wide along the Southern edge of Guatemala, and the department of Izabal on the eastern Caribbean coast are the newest centers of agricultural development. Both regions are among the less densely populated areas of Guatemala. Some of the main export crops--sugar cane, bananas and cotton--are produced in these regions.

The highland areas located in the central part of Guatemala are the most heavily populated areas of the country. The region includes very little flat land and has a wide range of climates. The eastern highlands are dry and less densely populated than the western highlands. The principal products produced in the highlands are corn, beans and wheat. Vegetables and fruits are also important in some highland areas. Coffee and bananas are grown in some of the lower valleys of the highlands.

The northern lowlands contain slightly over a third of the total land area of Guatemala but are virtually uninhabited. Efforts are being made to open up the Peten region through road construction programs. This region is expected to become increasingly important during the next twenty years.

1.1.2. Climate

Guatemala's climate varies considerably from one area to another due to differences in altitude, location of the mountains and direction of the prevailing winds. Temperatures in the coastal lowlands remain high all year ranging, on the average, from 20° to 33° centigrade (68° to 92° F.). The highlands are relatively cool with temperatures averaging around 17° to 22° centigrade (62° to 72° F.) most of the year but with

Table 1-1--Continued

Observation	Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<u>Izabal</u>												
Min. Avg. Temp. °C	18.6	18.8	16.3	22.3	22.2	23.0	22.9	21.9	21.1	20.4	17.6	17.2
Max. Avg. Temp. °C	26.5	30.5	28.7	33.1	33.1	32.6	32.4	31.9	32.7	31.8	27.2	25.6
Precipitation (mm)	155.2	198.1	197.4	122.2	56.1	315.7	99.6	107.2	207.3	144.3	260.1	106.0
No. Days of Rain	12	11	17	7	11	23	18	13	17	9	19	14
<u>Retalhuleu</u>												
Min. Avg. Temp. °C	18.9	19.9	20.0	19.4	25.6	25.1	24.8	24.8	24.7	24.6	24.0	23.4
Max. Avg. Temp. °C	32.5	33.2	33.5	30.8	30.8	29.8	30.4	30.2	29.8	30.0	30.1	30.7
Precipitation (mm)	0.0	0.0	3.1	148.7	445.1	535.7	476.7	358.8	435.4	439.1	0.0	0.0
No. Days of Rain	0	0	6	11	26	22	27	25	30	17	0	0
<u>Huehuetenango</u>												
Min. Avg. Temp. °C	17.2	17.9	18.5	18.3	17.8	17.3	17.5	17.7	18.2	16.7	15.5	13.4
Max. Avg. Temp. °C	21.5	22.0	22.5	22.8	21.7	21.1	21.3	22.0	22.0	20.8	20.7	18.7
Precipitation (mm)	0.0	0.5	64.0	104.0	153.0	417.0	147.0	211.0	318.0	125.0	0.0	0.0
No. Days of Rain	0	1	5	4	11	23	10	14	16	10	0	0
<u>Chiquimula</u>												
Min. Avg. Temp. °C	-	-	-	-	-	-	-	-	-	-	-	-
Max. Avg. Temp. °C	-	-	-	-	-	-	-	-	-	-	-	-
Precipitation (mm)	0.0	0.0	0.0	25.4	139.7	207.0	270.5	217.2	179.1	86.5	0.0	0.0
No. Days of Rain	0	0	0	2	7	15	13	16	14	5	0	0

Source: Statistics Bureau, Guatemala in Figures-1966.

TABLE 1-1
METEOROLOGICAL DATA OF SELECTED STATIONS FOR 1966

Observation	Month											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<u>Guatemala</u>												
Min. Avg. Temp. °C	12.1	12.8	13.3	15.8	16.0	16.1	15.9	15.4	15.5	15.0	11.9	11.5
Max. Avg. Temp. °C	23.0	24.7	24.5	26.6	25.8	24.5	24.5	24.7	24.6	23.9	21.3	21.9
Precipitation (mm)	08.7	26.7	38.3	53.8	181.8	271.0	173.0	247.5	120.8	121.3	04.0	00.0
No. Days of Rain	4	6	5	5	9	23	20	18	22	18	4	0
<u>Escuintla</u>												
Min. Avg. Temp. °C	21.7	21.6	21.8	21.9	21.8	21.8	21.7	21.7	21.5	21.3	21.7	21.5
Max. Avg. Temp. °C	28.0	27.1	28.2	28.2	27.4	26.4	25.8	27.5	26.9	26.9	28.0	28.0
Precipitation (mm)	25.0	18.0	21.0	340.0	829.0	867.0	407.0	752.0	1022.0	676.0	100.0	20.0
No. Days of Rain	3	6	6	23	25	30	25	26	25	25	2	2
<u>Alta Verapaz</u>												
Min. Avg. Temp. °C	12.3	12.6	13.8	15.3	15.6	16.1	15.6	14.4	16.1	15.4	13.4	11.4
Max. Avg. Temp. °C	22.9	23.8	22.8	26.4	25.8	24.6	25.4	25.3	25.9	25.0	21.9	22.3
Precipitation (mm)	116.0	73.0	165.0	230.0	130.0	298.0	259.0	214.0	272.0	248.0	253.0	61.0
No. Days of Rain	11	10	16	13	12	23	17	15	19	18	19	9
<u>Peten</u>												
Min. Avg. Temp. °C	-	-	-	-	-	-	-	-	-	-	-	-
Max. Avg. Temp. °C	-	-	-	-	-	-	-	-	-	-	-	-
Precipitation (mm)	90.0	40.5	83.0	18.5	162.0	298.5	184.2	112.0	186.5	90.0	91.5	14.5
No. Days of Rain	10	6	7	4	9	18	19	13	16	9	13	4

occasional freezing weather in some areas during the winter season. Meteorological data for selected stations for 1966 is presented in Table 1-1.

Rainfall varies considerably between regions. The rainy season in most areas occurs during the six month period from May until the end of October. Rainfall in the Escuintla region of the South Coast ranged from around 22 mm. during the dryest months to around 800 mm. on the average in the August-October period of 1966. Rainfall in the highlands regions around Huehuetenango in 1966 ranged from 0.0 mm. in the dryest months to an average of about 230 mm. during the May-October rainy season.

The wide seasonal variation in rainfall on the South Coast makes it difficult to maintain stable feed levels for dairy and beef cattle. Pastures dry up during the dry season and hay is difficult to cure during the wet season. Water control in the form of drainage, irrigation and flood control could play an important role in increasing the productivity of this region.¹

The long dry season in the highlands also reduces the carrying capacity of upland pastures and in some areas makes it difficult to start fruit trees. The possibilities of reducing these problems through irrigation projects are limited. Irrigation will undoubtedly play an important role eventually in increasing the productivity of some of the highland valleys; especially in vegetable producing areas.

¹For additional information on a nation-wide water control program see "Soil and Water Conservation, Farm Irrigation and Drainage, Watershed Protection," by Lloyd G. Signell, USAID/Guatemala report, September, 1965.

1.1.3. Transportation

Lack of transportation facilities constitutes one of the serious problems slowing the economic development and cultural integration of Guatemala. The Guatemalan government has been improving the road system in recent years through the construction of three major highways. The Pan-American Highway extends across the highlands from Mexico on the west to El Salvador on the east. The Atlantic Highway extends from Guatemala City to Puerto Barrios on the Caribbean coast and the Pacific Slope Highway extends along the southern slope of the volcanic chain from Guatemala City to the Mexican border.

A relatively adequate network of narrow dirt highways has been constructed throughout most of the heavily populated highland areas of the country. The vast lowlands, including the entire Peten region on the north, are virtually without all-weather roads. The lack of adequate roads is particularly serious on the South Coast where substantial amounts of land are still difficult to reach by road and, as a result, it is expensive to transport agricultural products from these regions to markets. Data on transportation costs of agricultural products between various points in the country are presented in the appendix. An idea of the importance of different types of roads can be obtained from Table 1.2. Figure 1.3 shows the major roads of the Guatemalan transportation network.

Guatemala has a railroad system of 625 miles connecting both coasts and the north and south borders. The importance of the railway system has declined in recent years as improvements in the highway system have made bus and truck transportation more competitive.

The government airline, Aviateca, provides rapid transportation between the main population centers in Guatemala. Aviateca has

TABLE 1-2
THE HIGHWAY SYSTEM IN GUATEMALA IN 1966

Type of Road	Kilometers	Per Cent of Total
Hard Surface	1,496	12.3
Gravel or Stabilized	5,754	47.2
Dirt or Drained All-weather	2,415	19.8
Unimproved, Dry-weather	2,525	20.7
TOTAL	12,190	100.0

Source: United States Embassy.

scheduled service with 14 points in the country, including daily flights between Guatemala City and the Peten. There are 19 other points serviced on a non-schedule basis.¹

1.1.4. Governmental Divisions

Guatemala is divided for administrative purposes into twenty-two departments, each headed by a governor appointed by the President. (Figure 1.4.) The departments in turn are divided into municipalities which are ruled by popularly elected municipal authorities. The central government administration is located in Guatemala City, the national capital.

1.1.5. Statistical Regions

Statistical data in Guatemala are compiled mainly by department

¹Pan American Union pamphlet on Guatemala (Washington, D.C., 1967).

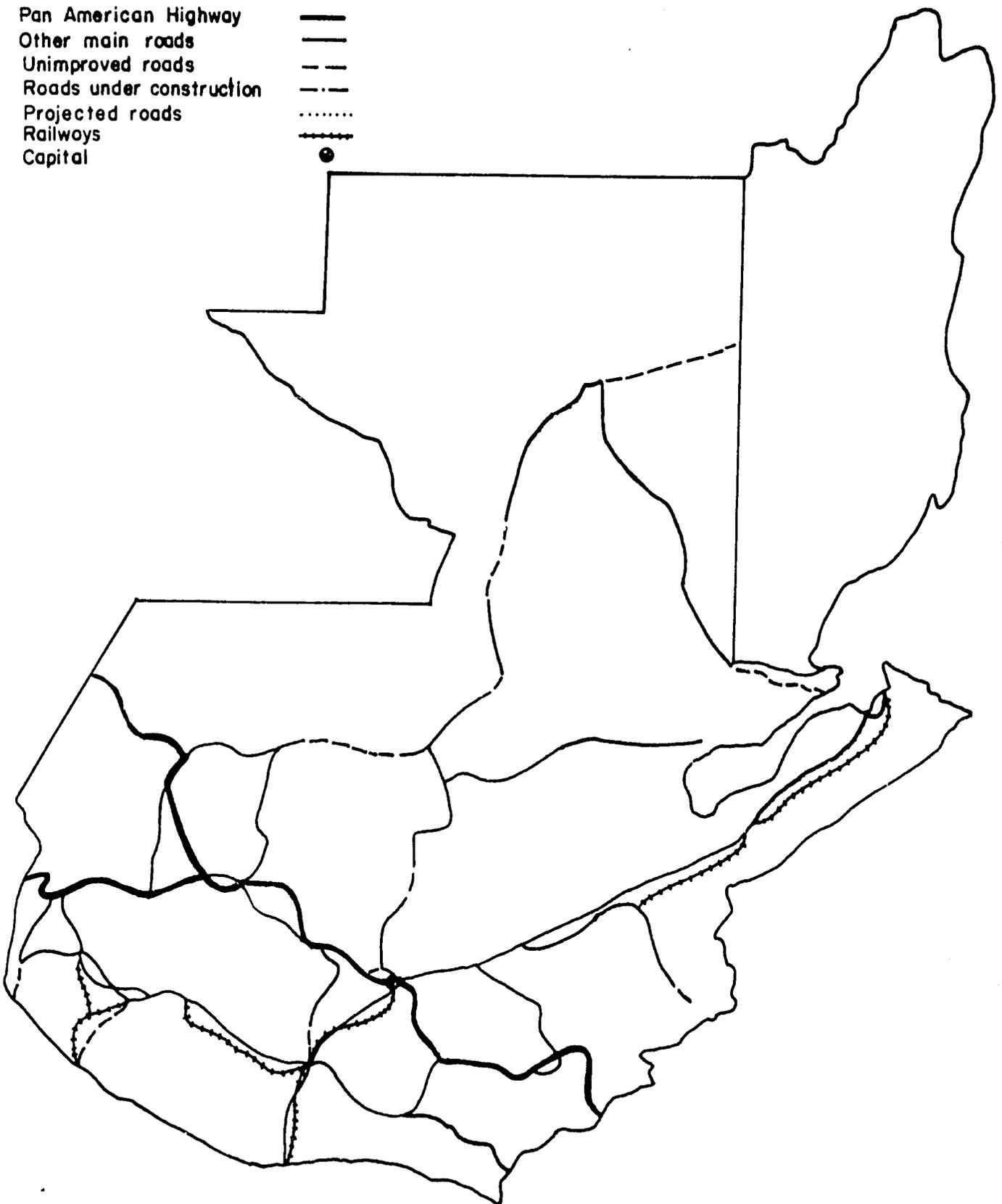


Figure 1.3 Guatemala - Transportation Network

* Source: Pan American Union

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Figure 1.4 Guatemala - Governmental Divisions (Departments)

and, to some extent, by municipality. In recent years the Statistics Bureau of the Government of Guatemala has been publishing yearly agricultural production data aggregated into nine zones; each zone consisting of two or three adjacent departments (Figure 1.5).

Much of the data presented in this report are summarized into three regions by aggregating the departmental data (Figure 1.6). These regions are:

- I. The Coastal Region consisting of the departments of Escuintla, Santa Rosa, Suchitepéquez, Retalhuleu, and Izabal.
- II. The Central Regions consisting of the 16 interior departments--Guatemala, El Progreso, Sacatepéquez, Chimaltenango, Sololá, Totonicapán, Quezaltenango, San Marcos, Huchuetenango, Quiché, Baja Verapaz, Alta Verapaz, Zacapa, Chiquimula, Jalapa and Jutiapa.
- III. The Petén Region consisting of the large northwestern department of Petén.

Both geographic and demographic differences were considered when defining these regions. The characteristics of the regions will be discussed in greater detail in Chapter 4.

From time to time certain data will be disaggregated into subregions and in some cases departmental figures will be presented. A case of particular importance occurs in Chapters 2 and 3 where income levels of the subsistence sector, located in the northern highlands, will be discussed and compared with levels in the more advanced south coast area. The subsistence sector in this case is defined as the departments of Chimaltenango, Totonicapán, Sololá, El Quiché, San Marcos,



Figure 1.5 Guatemala - Nine Zones used by Statistics Bureau



Figure I.6 Guatemala - Three Geographic Regions

Huehuetenango, Jalapa, and Alta Verapaz.

1.2. Population Characteristics¹

The population census of 1964 enumerated 4,287,328 persons in Guatemala; an increase of about one and a half million over the 1950 census. This increment represents an average annual growth rate of 3.1 per cent which ranks Guatemala as one of the fastest growing countries in the world.

1.2.1. Ethnic Composition

Presently Guatemalans are classified into two ethnic groups; Indian and Ladino. In 1964 Indians constituted 43.3 per cent of the total population and Ladinos accounted for the rest. The term "ladino" does not reflect biological or racial difference but refers to cultural differences. Indians are those descendants of the pre-colonial civilizations inhabiting Central America who have not adopted the characteristic features of modern Western Culture. Ladinos are non-Indians.

The Indians are primarily farmers living in the western highlands and in the northern area of the central region. Most Indians are poor, living at subsistence or near subsistence levels. The Indian who cannot raise enough food for his family may hire out as a laborer, perhaps to a coffee or cotton plantation on the south coast. Some Indians engage in the fabrication of handicrafts.

¹ Statistics cited in Section 1.2 are drawn from the following sources:

- a. Population Census, 1964, Statistics Bureau, Republic of Guatemala, June, 1966. (This census was a 5 per cent sample.)
- b. Sixth Population Census, 1950, Statistics Bureau, Republic of Guatemala.
- c. Commission on Natural and Human Resources; Third Congress of Economists, January, 1969.
- d. Guatemala in Figures, 1965 and 1966, Statistics Bureau, Republic of Guatemala.

Culturally, the Indians tend to remain isolated in their small communities maintaining old traditions and customs and continuing to use traditional production practices. Long range social and economic development planning for Guatemala must necessarily include special programs designed to reach these people.

Ladinos tend to be more urban and more highly education. They are, therefore, probably more susceptible to change. There are large numbers of ladinos engaged in agriculture on the coastal region and on the eastern highland slopes of the central region.

1.2.2. Birth and Death Rates

Guatemala's birth rate has shown a distinct downward trend during the past 20 years, having fallen gradually from 50.9 births per 1,000 inhabitants in 1950 to 46.3 per 1,000 in 1966. The mortality rate has also fallen from an estimated 21.8 deaths per 1,000 inhabitants in 1950 to 16.9 per 1,000 in 1966. Birth and death rates for the years 1950 through 1966 are presented in Table 1.3.

The percentage of young people under fifteen years of age is very high in Guatemala. According to the 1950 and 1964 censuses data, this percentage increased from 42.2 in 1950 to 46.0 in 1964.¹

A decline in the birth rate is usually associated with an older age structure since it is only the numbers of young people that is reduced. A decline in the death rate may have an effect upon the age structure, if it has a different impact on different age groups. The higher percentage of people under fifteen years of age indicates that the declining death

¹Alan Cohen, *op. cit.*, Table 3-2 taken from the 1964 Population Census, Statistics Bureau, Republic of Guatemala.

TABLE 1-3
 GUATEMALA: BIRTH RATES AND DEATH RATES, 1950-1966¹

Year	Birth Rate	Death Rate
1950	50.9	21.8
1951	52.3	19.6
1952	50.9	24.2
1953	51.1	23.1
1954	51.5	18.4
1955	48.8	20.6
1956	48.8	19.8
1957	49.4	20.6
1958	48.7	21.3
1959	49.8	17.3
1960	49.5	17.5
1961	49.9	16.3
1962	47.7	17.3
1963	47.7	17.2
1964 ²	46.4	16.1
1965 ²	46.1	17.2
1966 ²	46.3	16.9

Source: Statistics Bureau, "Guatemala in Figures; 1964 and 1966."

¹Rates are expressed as number per 1,000 inhabitants.

²Estimated.

rate has had its greatest impact on the younger generations and especially on the number of deaths at birth.

1.2.3. Population Density and Migration

With an area of 108,889 square kilometers, Guatemala had a 1964 population density of 39 persons per square kilometer. The population density figures for departments show an uneven distribution of the population, ranging from a low of 0.8 persons per square kilometer in El Peten to a high of 366 persons in the departments of Guatemala. In general, population density was highest in the western highlands of the central region. Within this region the departments of Guatemala, Sacatepéquez, Sololá, Totonicapán and Quezaltenango all had population densities of over 100 persons per square kilometer. Table 1-4 presents population density figures for 1950 and 1964.

Estimates of life-time migration within Guatemala show that 14 per cent of the inhabitants in 1964 were living in departments other than the one they were born in. Economic betterment appears to have been the underlying motive for the movements. Large numbers of migrants went to areas having a relative abundance of rich agricultural lands. Another prominent migration stream originated in the provinces and terminated in the Guatemala City area. The majority of the migrants went to the departments of Guatemala and Escuintla. There was also a substantial amount of migration into the departments of Izabal, Retalhuleu, Suchitepéquez and Quezaltenango.

1.2.4. Urban Areas

Slightly over 34 per cent of the total population was classified as urban in the 1964 census. The definition of what constitutes the urban

TABLE 1-4
AREA AND POPULATION DENSITY, 1950-1964

Region	Area (km ²)	Number of Inhabitants/km ²	
		1950	1964 ¹
<u>Republic of Guatemala</u>	108, 889	26	39
<u>Coastal Region</u>	20, 743	23	40
Escuintla	4, 384	28	57
Santa Rosa	2, 955	37	54
Suchitepéquez	2, 510	50	72
Retalhuleu	1, 856	36	61
Izabal	9, 038	6	13
<u>Central Region</u>	52, 292	44	64
Guatemala	2, 126	206	366
El Progreso	1, 922	25	34
Sacatepéquez	465	129	170
Chimaltenango	1, 979	61	82
Sololá	1, 061	78	102
Totonicapán	1, 061	93	134
Quezaltenango	1, 951	94	136
San Marcos	3, 791	61	87
Huehuetenango	7, 400	27	39
El Quiché	8, 378	21	30
Baja Verapaz	3, 124	21	31
Alta Verapaz	8, 686	22	30
Zacapa	2, 690	26	37
Chiquimula	2, 376	47	61
Jalapa	2, 063	36	48
Jutiapa	3, 219	43	59
<u>Peten Region</u>	35, 854	0.4	0.8
El Peten	35, 854	0.4	0.8

Source: Population Census, 1964.

¹Does not include persons living in institutions.

population changed between the census years of 1950 and 1964 thus making it impossible to quantify the relative change in the size of the urban population. Any area recognized by law as a city or town was classified as urban in the 1964 census.

Guatemala City is the country's most important urban center. Its population was 294,000 in 1950 and 577,120 in 1964 which represented an average annual growth rate of 4.9 per cent. There are eight other important urban areas in Guatemala which in 1964 had populations ranging from 14,000 to 45,000 inhabitants. Quezaltenango is the second largest city in the Republic and is an important trading and banking center for a large agricultural area. Other important urban areas are the cities of Antigua, Mazatenango, Puerto Barrios, Escuintla, Retalhuleu, Chiquimula and Coatepeque.

1.2.5. Literacy and Education Levels

The proportion of the population seven years and older that could read and write increased from 28.1 per cent in 1950 to 36.7 per cent in 1964. The proportion of the population classified as literate varied considerably between urban and rural areas. More than 60 per cent of the population over seven years of age in the urban areas in 1964 could read and write while less than 25 per cent of the rural population in the same age class was classified as literate.

The 1964 census also indicated that less than 5 per cent of the population seven years and older had finished elementary school, while less than 1.0 per cent finished secondary education. School enrollment figures indicated that only 25 per cent of the young people between the ages of seven and twenty-four years were actually attending classes. The

percentage for rural areas was only 15.2 while that of the urban areas was 45.3. More detailed statistics on literacy and education are presented in Table 1-5.

1.2.6. Employment Status

The results of the employment survey conducted by the Statistics Bureau as part of the 1964 population census show that 1,317,140 persons seven years and older were classified as economically active. The term "economically active" applies to a wide range of people, including those looking for work (1.5 per cent of the economically active population) as well as those employed less than full time. Since the amount of time worked by the various members of the economically active population are not known the census classification is of limited value in determining employment levels. Nevertheless the results of the employment survey appear to be the best indicators of overall employment levels available in Guatemala.

The same definition of "economically active" was used in both the 1950 and 1964 employment surveys. The number of persons classified as economically active increased by 349,326 between the two surveys. This represents an average annual growth rate of 2.2 per cent which is well below the 3.1 per cent rate of growth of the population.

Of the 1,317,140 economically active persons in 1964, 461,960 were classified as urban and 855,180 as rural. These figures represent 41.5 per cent of the population seven years and older for each group. (Table 1.6.) The percentage of males in the "seven years and older" age group, on the other hand, was 66.3 per cent in urban areas and 76.0 per cent in rural areas. Similar data for the coastal, central and Peten

TABLE 1-5
LITERACY AND EDUCATION STATISTICS, 1964

Guatemala	Total	Urban	Rural
Population (Total) ¹	4, 209, 820	1, 433, 020	2, 776, 800
Population 7 years or older	3, 174, 900	1, 112, 020	2, 062, 880
Number of analphabets 7 years or older	2, 008, 320	402, 920	1, 605, 400
Percentage of population over 7 years of age that are analphabets	63.3	36.2	77.8
Population over 7 years of age that have not gone to school	2, 148, 560	465, 400	1, 683, 160
Percentage of population over 7 years that have not gone to school	67.7	41.9	81.6
Population over 7 years that have finished primary education	132, 680	115, 820	16, 860
Percentage of population over 7 years that have finished primary education	4.2	10.4	0.8
Population over 7 years that have finished secondary education	5, 260	5, 000	260
Percentage of population over 7 years that have finished secondary education	0.2	0.4	-
Population over 7 years that have finished studies in the university	14, 060	13, 500	560
Percentage of population over 7 years that have finished studies in the university	0.4	1.2	-
Population between 7 and 24 years of age	1, 664, 020	562, 780	1, 101, 260
Number of students between the ages of 7 and 24 years	421, 700	254, 890	166, 810
Percentage of the population 7 to 24 years that are students	25.3	45.3	15.2

Source: Statistics Bureau, 1964 Population Census.

¹Does not include persons living in institutions.

TABLE 1-6
GENERAL LEVEL OF EMPLOYMENT

Guatemala	Total	Urban	Rural
Population (Total) ¹	4,209,820	1,433,020	2,776,800
Population 7 years or more	3,174,900	1,112,020	2,062,880
Number of males 7 years or more	1,580,200	520,300	1,059,900
Number of females 7 years or more	1,594,700	591,720	1,002,980
Population 7 years or more economically active	1,317,140	461,960	855,180
Percentage economically active	41.49	41.54	41.46
Number of males 7 years or more economically active	1,150,580	344,720	805,860
Percentage of males economi- cally active	72.81	66.25	76.03
Number of females 7 years or more economically active	166,560	117,240	49,320
Percentage of females econ- omically active	10.44	19.81	4.92

Source: Statistics Bureau, 1964 Population Census.

¹ Does not include persons living in institutions.

regions are presented in the appendix. The results indicate very slight differences between regions.

Further analysis of the 1964 census showed a total of 2,249,260 persons in the age group 14 through 64 years, of which 52.0 per cent were economically active. The percentage of males in this group was 92.0.

Employment survey data reflecting the numbers of economically active persons by sector of activity are available for both 1950 and 1964. These data were tabulated by department and region and are presented in Tables 1-7 and 1-8. Several things stand out in these tables. The percentage of economically active population engaged in agriculture and kindred occupations was 65.4 in 1964; a slight drop from 68.2 per cent in 1950. Such a high percentage is typical for less-developed countries. The slight percentage decrease tends to hide the fact that in terms of absolute numbers there was an increase of 201,590 persons economically active in agriculture--which is almost a 30 per cent increase over the 1950 figure. More than half of the increase in numbers (133,984) occurred in the central region, an area already characterized by minifundia in 1950. The possibilities for increasing the land area under cultivation in this region are very limited. The result is that the small farms became even smaller ones between 1950 and 1964.

While overall employment in agriculture increased at an average annual rate of 1.9 per cent, the average annual rate for all other sectors was 2.8 per cent. It is worth noting that the industrial-manufacturing sector had an average annual growth rate of employment of only 2.2 per cent and thus did not serve as an important outlet for underemployed farm labor. This becomes especially apparent when considering the small

TABLE 1-7
EMPLOYMENT BY SECTOR--GUATEMALA (1964)

Sector	All Sectors	Agriculture, Forestry, Hunting and Fishing	% Economically Active Pop. in Agriculture	Mining	Industrial Manufacturing	Construction	Electricity, Gas, Water & Sanitation	Commerce	Transportation and Communication	Services	Not Specified
Coastal Region	253,020	198,300	78.37	720	14,840	3,460	540	9,540	7,460	16,740	1,460
Escuintla	82,040	62,980	76.78	200	6,240	1,120	100	3,520	2,240	5,420	220
Santa Rosa	46,960	39,540	84.20	140	1,860	900	220	1,220	520	2,480	80
Suchitepéquez	54,360	42,620	78.40	20	3,380	720	60	2,200	1,160	4,060	140
Retalhuleu	35,740	28,120	78.68	220	1,660	460	80	1,020	960	2,560	660
Izabal	33,920	25,040	73.82	100	1,700	260	80	1,580	2,580	2,220	360
Central Region	1,055,740	657,280	62.26	980	134,020	30,600	1,140	72,380	20,540	130,440	8,320
Guatemala	259,580	36,540	14.08	380	62,120	18,960	820	35,900	13,200	85,480	6,180
El Progreso	19,020	15,380	80.86	-	880	380	-	680	500	1,100	100
Sacatepéquez	24,980	16,120	64.53	-	3,120	860	40	1,220	380	2,860	380
Chimaltenango	48,400	39,460	81.53	40	380	700	20	860	620	2,860	40
Sololá	36,120	30,180	83.55	40	2,900	320	-	1,280	140	1,260	-
Tonicapán	41,660	11,940	28.66	-	16,080	300	-	1,440	140	1,760	-
Quezaltenango	80,420	50,820	63.19	40	11,380	1,960	120	5,360	1,260	8,720	760
San Marcos	105,540	90,340	85.60	20	6,460	980	40	2,380	820	4,420	80
Huehuetenango	92,200	79,540	86.27	120	5,420	800	-	1,980	420	3,900	20
El Quiché	80,160	66,020	82.36	100	5,880	660	-	4,540	480	2,420	60
Baja Verapaz	29,320	24,620	83.97	-	1,760	360	-	520	240	1,820	-
Alta Verapaz	79,020	65,920	83.42	20	5,140	580	40	2,300	420	4,560	40
Zacapa	29,280	21,300	72.75	200	2,320	860	40	1,100	780	2,500	180
Chiquimula	45,140	36,460	80.77	-	2,980	1,520	20	1,160	460	2,460	80
Jalapa	30,180	25,480	84.43	-	1,580	460	-	640	340	1,580	100
Jutiapa	54,720	47,160	86.18	60	2,200	900	-	1,020	340	2,740	300
Petén Region	8,380	5,560	66.35	20	600	160	-	360	180	1,480	20
El Peten	8,380	5,560	66.35	20	600	160	-	360	180	1,480	20
Republic of Guatemala	1,317,140	861,140	65.38	1,720	149,460	34,220	1,680	82,280	28,180	148,660	9,800

Source: Population Census, 1964 (5.0 Per cent sample) Bureau of Statistics.

TABLE 1-8
EMPLOYMENT BY SECTOR--GUATEMALA (1950)

Sector	All Sectors	Agriculture, Forestry, Hunting and Fishing	% Economically Active Pop. in Agriculture	Mining	Industrial Manufacturing	Construction	Electricity & Gas, Water & Sanitation	Commerce	Transportation and Communication	Services	Not Specified
Coastal Region	173,008	131,990	76.29	608	10,604	3,458	258	8,450	3,313	13,248	1,079
Escuintla	48,646	37,209	76.49	225	2,793	1,106	141	1,983	932	3,761	496
Santa Rosa	36,136	30,647	84.81	119	1,740	817	25	770	189	1,768	61
Suchitepéquez	43,837	34,421	78.52	50	3,172	641	42	1,344	723	3,217	227
Retalhuleu	23,880	18,361	76.89	210	1,530	442	21	941	461	1,781	133
Izabal	20,509	11,352	55.35	4	1,369	452	29	3,412	1,008	2,721	162
Central Region	788,580	523,296	66.36	833	100,547	22,620	979	43,950	11,938	81,516	2,901
Guatemala	164,690	37,487	22.76	213	38,699	13,926	537	18,965	7,485	45,609	1,769
El Progreso	16,599	12,041	72.54	4	2,148	372	9	491	385	1,094	55
Sacatepéquez	20,309	13,558	66.76	6	2,308	762	15	1,022	367	2,187	84
Chimaltenango	41,470	34,311	82.74	15	3,181	518	36	929	327	2,059	94
Sololá	27,270	23,052	84.53	6	1,758	309	2	764	99	1,217	63
Totonicapán	33,214	9,730	29.29	0	12,667	312	5	8,753	99	1,548	100
Quezaltenango	65,507	42,593	65.02	54	9,931	1,423	227	3,985	888	6,200	206
San Marcos	84,554	71,932	85.07	16	5,630	951	23	1,586	413	3,937	66
Huehuetenango	66,672	57,245	85.86	126	4,824	630	26	1,128	191	2,427	75
El Quiché	57,876	49,343	85.26	70	3,825	348	14	1,901	207	2,110	58
Baja Verapaz	22,340	18,450	82.59	7	1,881	505	7	245	64	1,134	47
Alta Verapaz	58,168	48,372	83.16	171	4,054	372	18	1,040	346	3,724	71
Zacapa	22,930	15,804	68.90	0	2,779	481	18	919	582	2,290	66
Chiquimula	37,526	31,255	83.29	11	2,618	426	13	809	189	2,146	59
Jalapa	24,971	20,369	81.57	36	2,178	574	14	488	120	1,163	29
Jutiapa	44,475	37,754	84.89	98	2,066	711	15	925	176	2,671	59
Peten Region	6,226	4,264	68.49	0	387	349	7	161	101	941	16
El Peten	6,226	4,264	68.49	0	387	349	7	161	101	941	16
Republic of Guatemala	967,814	659,550	68.15	1,441	111,538	26,427	1,244	52,561	15,352	95,705	3,996

Source: Sixth Population Census, 1950--Bureau of Statistics.

size of the industrial sector in terms of the number of people employed; 11.5 per cent of the economically active population in both 1950 and 1964.

1.3. Population and Employment Projections

The population and employment projections presented in this section were prepared by the National Planning Council and are based on trends exhibited between the census years of 1950 and 1964. Projections were made for the years 1970, 1972, 1975 and 1980 on the assumption that the 1950 to 1964 trends would continue.

1.3.1. Methodological Note

The Planning Council departmental population projections presented in Table 1-9 were derived by extrapolating the 1964 census enumerations using the average annual growth rates of population exhibited between the 1950 to 1964 period for the various departments. Regional and total population projections are sums of departmental figures of the departments included within the respective regions or total. The same calculation procedure was used for the agricultural employment projections in Table 1-11 and for the projections of non agricultural employment presented in Table 1-12. Total employment projections in Table 1-10 were derived by aggregating the results of Tables 1-11 and 1-12.

1.3.2. Population Projections

The Guatemalan population is expected to pass the seven million mark by 1980. Projections for 1970, 1972, 1975 and 1980 prepared by the National Planning Council are presented in Table 1-9.

The densely populated central region will experience the largest increase in numbers; more than two million by 1980. It is important to note that over one third of the increase in numbers for the central

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TABLE 1-9
POPULATION--GUATEMALA
(Thousands)

Sector	1950 ^a	1961 ^b	Average Annual Rate of Growth	Population Projections			
				1970	1972	1975	1980
Coastal Region	480	827	4.0 ¹	1,048.6	1,135.8	1,281.6	1,572.0
Escuintla	124	257	5.3	350.4	388.5	453.6	588.4
Santa Rosa	110	163	2.8	192.4	203.3	220.9	253.6
Suchitepéquez	124	184	2.8	217.2	229.5	249.3	286.2
Retalhuleu	67	116	4.0	146.8	158.8	178.6	217.3
Izabal	55	107	4.8	141.8	155.7	179.2	226.5
Central Region	2,295	3,427	2.9 ¹	4,096.9	4,322.2	4,720.3	5,474.2
Guatemala	439	793	4.3	1,020.9	1,110.6	1,260.1	1,555.3
El Progreso	48	68	2.5	78.9	82.9	89.2	100.9
Sacatepéquez	60	81	2.2	92.3	96.4	102.9	114.7
Chimaltenango	121	163	2.1	184.6	192.5	204.9	227.3
Sololá	83	111	2.1	125.7	131.1	139.5	154.8
Totonicapán	99	146	2.8	172.3	182.1	197.8	227.1
Quezaltenango	184	270	2.7	316.8	334.1	361.9	413.5
San Marcos	233	334	2.6	389.6	410.1	442.9	503.6
Huehuetenango	200	291	2.7	341.5	360.1	390.1	445.7
El Quiché	175	261	2.9	309.9	328.1	357.5	412.4
Baja Verapaz	66	99	2.9	117.5	124.4	135.6	156.4
Alta Verapaz	190	266	2.4	306.7	321.6	345.3	338.8
Zacapa	70	98	2.4	133.0	118.5	127.2	143.2
Chiquimula	113	150	2.0	167.9	174.6	185.3	204.6
Jalapa	75	103	2.3	118.1	123.6	132.3	148.2
Jutiapa	139	193	2.3	221.2	231.5	247.8	277.7
Peten Region	16	30	4.6	39.3	43.0	49.2	61.6
El Peten	16	30	4.6	39.3	43.0	49.2	61.6
Republic of Guatemala	2,791	4,284	3.1 ¹	5,184.8	5,501.0	6,051.1	7,107.8

Source: (a) Sixth Population Census, 1950, Bureau of Statistics.
(b) Population Census, 1964 (5.0 per cent sample), Bureau of Statistics.

¹Not used for projections. See methodological note.

TABLE 1-10

EMPLOYMENT PROJECTIONS--ALL SECTORS
(Including Persons Actively Looking for Work)

Sector	Population Economically Active-1950 ^a	Population Economically Active-1964 ^b	Ave. Annual ¹ Rate of Employment 1950-1964
Coastal Region	173,008	253,020	2.7
Escuintla	48,646	82,040	3.8
Santa Rosa	36,136	46,960	1.9
Suchitepéquez	43,837	54,360	1.6
Retalhuleu	23,880	35,740	2.9
Izabal	20,509	33,920	3.6
Central Region	788,580	1,055,740	2.3
Guatemala	164,690	259,580	3.3
El Progreso	16,599	19,020	1.0
Sacatepéquez	20,309	24,980	1.5
Chimaltenango	41,470	48,400	1.1
Sololá	27,270	36,120	2.0
Totonicapán	33,214	41,660	1.6
Quezaltenango	65,507	80,420	1.4
San Marcos	84,554	105,540	1.6
Huehuetenango	66,672	92,200	2.3
El Quiché	57,876	80,160	2.3
Baja Verapaz	22,340	29,320	2.0
Alta Verapaz	58,168	79,020	2.2
Zacapa	22,939	29,280	1.7
Chiquimula	37,526	45,140	1.3
Jalapa	24,971	30,180	1.4
Jutiapa	44,475	54,720	1.5
Peten Region	6,226	8,380	2.1
El Peten	6,226	8,380	2.1
Republic of Guatemala	967,814	1,317,140	2.2

Source: (a) Sixth Population Census, 1950, Bureau of Statistics.
(b) Population Census, 1964, (5.0 Per Cent Sample), Bureau of Statistics.

¹ Not used for projection purposes. See methodological note.

TABLE 1-10--Continued

Sector	Employment Projections			
	1970	1972	1975	1980
Coastal Region	300,837	319,213	349,425	407,906
Escuintla	102,474	110,362	123,344	148,462
Santa Rosa	52,459	54,433	57,534	63,103
Suchitepéquez	59,512	61,336	64,178	69,210
Retalhuleu	42,554	45,106	49,227	56,958
Izabal	43,838	47,976	55,142	70,173
Central Region	1,206,006	1,262,136	1,352,409	1,472,506
Guatemala	319,950	343,558	382,748	410,704
El Progreso	20,330	20,947	21,770	23,279
Sacatepéquez	27,395	28,252	29,591	31,975
Chimaltenango	51,722	52,881	54,668	57,790
Sololá	40,874	42,595	45,314	50,241
Totonicapán	45,858	47,350	49,681	53,825
Quezaltenango	87,858	90,491	94,594	101,859
San Marcos	116,378	120,234	126,261	136,991
Huehuetenango	106,045	111,108	119,163	133,905
El Quiché	92,372	96,873	104,067	117,354
Baja Verapaz	33,001	34,330	36,425	40,208
Alta Verapaz	89,954	93,926	100,215	111,644
Zacapa	32,498	33,656	35,480	38,765
Chiquimula	48,883	50,207	52,270	55,922
Jalapa	32,780	33,704	35,145	37,700
Jutiapa	60,108	62,024	65,017	70,244
Peten Region	9,514	9,926	10,579	11,766
El Peten	9,514	9,926	10,579	11,766
Republic of Guatemala	1,516,357	1,591,275	1,712,413	1,892,178

TABLE 1-11
EMPLOYMENT PROJECTIONS--
AGRICULTURE, FORESTRY, HUNTING AND FISHING

Sector	Population Economically Active-1950 ^a	Population Economically Active-1964 ^b	Ave. Annual Rate of Employment 1950-1964
Coastal Region	131,990	198,300	2.9 ¹
Escuintla	37,209	62,980	3.8
Santa Rosa	30,647	39,540	1.8
Suchitepéquez	34,421	42,620	1.5
Retalhuleu	18,361	28,120	3.1
Izabal	11,352	25,040	5.8
Central Region	523,296	657,280	1.6 ¹
Guatemala	37,487	36,540	-0.2
El Progreso	12,041	15,380	1.8
Sacatepéquez	13,558	16,120	1.3
Chimaltenango	34,311	39,460	1.0
Sololá	23,052	30,180	2.0
Totonicapán	9,730	11,940	1.4
Quezaltenango	42,593	50,820	1.3
San Marcos	71,932	90,340	1.7
Huehuetenango	57,245	79,540	2.4
El Quiché	49,343	66,020	2.1
Baja Verapaz	18,450	24,620	2.1
Alta Verapaz	48,372	65,920	2.2
Zacapa	15,804	21,300	2.1
Chiquimula	31,255	36,460	1.1
Jalapa	20,369	25,480	1.6
Jutiapa	37,754	47,160	1.7
Peten Region	4,264	5,560	1.9
El Peten	4,264	5,560	1.9
Republic of Guatemala	659,550	861,140	1.9 ¹

Source: (a) Sixth Population Census, 1950; Bureau of Statistics
(b) Population Census, 1964 (5.0 per cent sample); Bureau of Statistics.

¹ Not used for projection purposes. See methodological note.

TABLE 1-11--Continued

Sector	Employment Projections			
	1970	1972	1975	1980
Coastal Region	238,261	253,682	279,112	328,576
Escuintla	78,773	84,873	94,920	14,375
Santa Rosa	44,004	45,602	48,107	52,593
Suchitepéquez	46,599	48,006	50,198	54,075
Retalhuleu	33,769	35,894	39,336	45,822
Izabal	35,116	39,307	46,551	61,711
Central Region	727,030	752,242	791,749	862,844
Guatemala	36,104	35,960	35,744	35,389
El Progreso	17,017	17,739	18,714	20,460
Sacatepéquez	17,420	17,875	18,580	19,820
Chimaltenango	41,890	42,732	44,026	46,272
Sololá	33,988	35,361	37,525	41,431
Totonicapán	12,978	13,344	13,912	14,913
Quezaltenango	54,916	56,353	58,580	62,488
San Marcos	99,955	103,382	108,744	118,308
Huehuetenango	91,704	96,159	103,252	116,252
El Quiché	74,788	77,963	82,979	92,066
Baja Verapaz	27,890	29,074	30,944	34,332
Alta Verapaz	75,114	78,456	83,749	93,375
Zacapa	24,128	25,152	26,770	29,701
Chiquimula	38,933	39,794	41,122	43,433
Jalapa	28,026	28,930	30,341	32,846
Jutiapa	52,179	53,968	56,767	61,758
Peten Region	6,226	6,465	6,841	7,516
El Peten	6,226	6,465	6,841	7,516
Republic of Guatemala	951,517	1,012,389	1,077,702	1,198,936

TABLE 1-12

EMPLOYMENT PROJECTIONS--ALL SECTORS EXCLUDING
AGRICULTURE, FORESTRY, HUNTING AND FISHING

Sector	Population Economically Active-1950 ^a	Population Economically Active-1964 ^b	Ave. Annual Rate of Employment 1950-1964
Coastal Region	41,018	54,720	2.1 ¹
Escuintla	11,437	19,060	3.7
Santa Rosa	5,489	7,420	2.2
Suchitepéquez	9,416	11,740	1.6
Retalhuleu	5,519	7,620	2.4
Izabal	9,157	8,880	-0.3
Central Region	265,284	398,460	2.9 ¹
Guatemala	127,203	223,040	4.1
El Progreso	4,558	3,640	-1.6
Sacatepéquez	6,751	8,860	2.0
Chimaltenango	7,159	8,940	1.6
Sololá	4,218	5,940	2.5
Totonicapán	23,484	29,720	1.7
Quezaltenango	22,914	29,600	1.8
San Marcos	12,622	15,200	1.3
Huehuetenango	9,427	12,660	2.1
El Quiché	8,535	14,140	3.7
Baja Verapaz	3,890	4,700	1.4
Alta Verapaz	9,796	13,100	2.1
Zacapa	7,135	7,980	0.8
Chiquimula	6,271	8,680	2.3
Jalapa	4,602	4,700	0.2
Jutiapa	6,721	7,560	0.8
Peten Region	1,962	2,820	2.6
El Peten	1,962	2,820	2.6
Republic of Guatemala	308,264	456,000	2.8 ¹

Source: (a) Sixth Population Census, 1950; Bureau of Statistics
(b) Population Census, 1964 (5.0 per cent sample); Bureau of
Statistics.

¹Not used for projection purposes. See methodological note.

TABLE 1-12--Continued

Sector	Employment Projections			
	1970	1972	1975	1980
Coastal Region	62,576	65,531	70,313	79,330
Escuintla	23,701	25,489	28,424	34,087
Santa Rosa	8,455	8,831	9,427	10,510
Suchitopéquez	12,913	13,330	13,980	15,135
Retalhuleu	8,785	9,212	9,891	11,136
Izabal	8,722	8,669	8,591	8,462
Central Region	478,976	509,894	560,660	609,662
Guatemala	283,846	307,598	347,004	375,315
El Progreso	3,313	3,208	3,056	2,819
Sacatepéquez	9,975	10,377	11,011	12,155
Chimaltenango	9,832	10,149	10,642	11,518
Sololá	6,886	7,234	7,789	8,810
Totonicapán	32,880	34,006	35,769	38,912
Quezaltenango	32,942	34,138	36,014	39,371
San Marcos	16,423	16,852	17,517	18,683
Huehuetenango	14,341	14,949	15,911	17,653
El Quiché	17,584	18,910	21,088	25,288
Baja Verapaz	5,111	5,256	5,481	5,876
Alta Verapaz	14,840	15,470	16,466	18,269
Zacapa	8,370	8,504	8,710	9,064
Chiquimula	9,950	10,413	11,148	12,489
Jalapa	4,754	4,774	4,804	4,854
Jutiapa	7,929	8,056	8,250	8,586
Peten Region	3,288	3,461	3,738	4,250
El Peten	3,288	3,461	3,738	4,250
Republic of Guatemala	544,840	578,886	634,711	693,242

region is expected to occur in the capital department of Guatemala as people move into the city in search of employment opportunities. Guatemala City will have more than double its 1964 population in 1980 if current trends continue.

The fastest growing area of significance is the coastal region which had a 4.0 per cent average annual rate of population increase. This was considerably higher than the 2.9 per cent rate for the central region. By 1980 the coastal region is expected to have double the 1964 population estimate as rural people continue to move into areas having a relative abundance of rich agricultural lands. The Peten region showed a higher rate of population growth (4.6 per cent) but the increase in terms of absolute numbers was very small compared to other regions.

1.3.3. Employment Projections

Employment projections presented in this section are based on extrapolations of the economically active population. The reader should keep in mind the limitations of this classification mentioned in section 1.2.6.

In 1980, 1,892,078 Guatemalans are expected to be economically active representing an increase of 574,938 over 1964 (Table 1-10). If current trends continue there will be 3.8 inhabitants for each economically active person in 1980, whereas in 1964 there were only 3.3 inhabitants for each economically active person. It should be pointed out that the employment survey of 1964 did not include 74,653 members of the population living in non-family institutions such as hotels, hospitals and pensions; thus the status of these people is not known.

Another point which merits attention when trying to determine the

overall level of employment is that part of the economically active population is not actually employed but in the process of looking for work. In 1950 0.4 per cent (approximately 3,870 persons) of the economically active population was looking for work. The corresponding figures for 1964 were 1.5 per cent or 19,260 persons. If similar annual rates of increase continue there will be between 52,000 and 230,000 economically active people looking for work in 1980.

Departmental and regional projections were made for the number of people economically active in agriculture (Table 1-11). For the country as a whole it is expected that there will be 1,198,936 economically active persons in agriculture by 1980, an increase of 337,796. The percentage of the labor force in agriculture is not expected to change significantly. Expectations are that 63.4 per cent of the economically active population in 1980 will be engaged in agriculture, a very slight drop from 65.4 per cent in 1964. The central region will probably experience the largest percentage drop as people move to the capital in search of urban employment, however the majority (58.6 per cent) of the economically active population in this region will still be engaged in agriculture.

CHAPTER 2

THE STRUCTURE AND PERFORMANCE OF THE GUATEMALAN ECONOMY

2.1. Overall Performance 1950-1966

The economic growth of the Guatemalan economy over the period 1950-1966 was modest. (The values of the major macro-economic variables are given in Table 2.1 in constant 1958 prices covering the period 1950-1966. Table 2.2 provides the cumulative growth rates of a number of variables over the same period.) The cumulative growth rate of Gross Domestic Product (corrected for the terms-of-trade effect) at constant prices amounted to 4.4 per cent between 1950-1952 (average) and 1964-1966 (average) - only slightly above the population growth rate. As a consequence, per capita income growth was just above one per cent per annum over the above period. The evidence strongly suggests that the growth of the economy was export-led. Exports grew at an annual cumulative rate of 7.8 per cent which is considerably higher than the average export growth of the developing world (i.e. 5 per cent) in the same period. It will be argued subsequently that the growth mechanism started in the export sector. Exports together with changes in the terms-of-trade affected private investment which in turn affected national income.

The remarkable export performance was partially neutralized by a large worsening of the terms-of-trade. The growth rate of exports corrected for the terms-of-trade effects ($E + Z$) amounted to 5.8 per cent

TABLE 2-1

GUATEMALA: MAJOR MACROECONOMIC VARIABLES - 1950-1966
 IN CONSTANT 1958 PRICES
 (Thousands of Quetzales)

Year	Public Transfers	Indirect Taxes	Public Consumption	Private Consumption	Imports of Goods and Services	Private Investment	Public Savings	Public Investment	Total Consumption	Total Investment
	Tr	Ti	Cg	CP	M	IP	Sg	IG	C	I
1950	4,700	37,583	47,043	608,013	104,911	61,638	6,105	20,032	655,056	81,670
1951	5,012	42,405	51,272	614,244	94,472	59,376	8,387	20,557	665,516	79,933
1952	6,150	49,206	59,116	620,372	84,967	45,432	10,717	23,508	679,488	68,940
1953	6,330	52,229	59,729	647,942	95,080	42,312	14,240	25,278	707,671	67,590
1954	5,745	56,765	56,745	684,325	105,768	41,108	24,398	25,931	741,070	67,039
1955	5,490	60,015	54,127	674,852	121,559	55,896	34,312	34,524	728,979	90,420
1956	6,179	61,876	61,683	719,250	153,196	91,309	31,855	51,172	781,113	142,481
1957	7,002	66,826	66,626	763,606	167,210	93,936	33,318	60,285	830,232	154,221
1958	7,669	69,912	70,430	813,041	164,338	86,397	32,307	49,918	883,471	136,315
1959	9,590	72,091	77,750	841,359	163,049	87,355	21,825	38,163	919,109	125,518
1960	8,778	73,548	79,561	868,662	165,231	80,964	22,435	26,848	948,223	107,812
1961	9,885	72,905	83,231	906,867	152,933	81,084	20,249	32,369	990,098	113,473
1962	8,890	69,484	73,800	958,704	164,752	81,438	23,998	27,240	1,032,504	108,678
1963	7,971	80,553	73,070	1,020,974	213,401	107,815	29,859	20,990	1,094,044	128,805
1964	9,618	89,692	79,875	1,073,376	234,186	125,226	31,480	32,564	1,153,251	157,790
1965	12,043	105,104	90,974	1,101,642	246,955	127,421	43,193	31,434	1,192,616	158,855
1966	13,294	104,895	88,354	1,112,865	248,023	129,079	43,186	35,921	1,201,219	165,000

TABLE 2-1--Continued

Year	Gross Domestic Product	Exports Lagged One Year	Terms of Trade Effect Lagged One Year	Direct Taxes	Net Non-Tax Public Income	Domestic And Foreign Loans	Changes in Stocks	Exports of Goods and Services	Terms of Trade Effect	Public Financial Investment
	X	E-1	Z-1	T _d	T ₀	F	ΔS	E	Z	I _g
1950	736,433	--	--	10,700	9,548	22,583	-958	91,487	14,089	8,656
1951	744,498	91,487	14,089	11,600	10,671	23,567	-458	82,006	11,973	11,397
1952	756,848	82,006	11,973	13,600	13,183	28,919	-6,973	91,236	9,124	15,128
1953	790,504	91,236	9,124	14,900	13,199	29,250	-1,213	93,898	15,212	18,212
1954	815,887	93,898	15,211	17,000	13,088	21,058	259	87,010	26,277	19,525
1955	834,464	87,010	26,277	18,800	15,129	28,840	14,114	97,153	25,357	28,628
1956	913,827	97,153	25,357	20,800	17,197	40,609	7,192	105,121	31,116	21,292
1957	954,154	105,121	31,116	23,300	16,846	42,087	4,173	111,078	21,660	19,194
1958	976,055	111,078	21,660	23,600	16,906	34,537	-1,068	121,675	0	16,926
1959	1,013,715	121,675	0	21,900	15,165	50,443	-3,305	145,950	-10,508	34,105
1960	1,039,867	145,950	-10,508	21,800	15,474	35,250	5,417	152,978	-9,332	30,837
1961	1,073,124	152,978	-9,332	23,100	17,365	40,098	-12,985	156,614	-21,143	27,958
1962	1,114,937	156,614	-21,143	21,600	15,688	40,313	-6,033	162,587	-18,047	38,992
1963	1,209,394	162,587	-18,047	19,500	10,800	25,741	8,586	223,030	-31,670	35,307
1964	1,279,477	223,030	-31,670	21,500	9,773	43,526	7,316	214,386	-19,080	45,596
1965	1,324,855	214,386	-19,080	25,600	15,510	13,855	8,234	242,406	-30,301	25,614 ¹
1966	1,368,293	242,406	-30,301	28,100	11,834	973	1,494	298,085	-49,482	8,238 ¹

Source: Banco de Guatemala. Cuentas Nacionales, 1968.

¹Estimates

TABLE 2-2

CUMULATIVE GROWTH RATES OF MAJOR VARIABLES
1950-1952 (AVERAGE) TO 1964-1966 (AVERAGE)
IN CONSTANT 1958 PRICES

Variable		Growth Rate
Gross Domestic Product	(X)	4.4 Per Cent
Total Consumption	(C)	4.2 Per Cent
Public Consumption	(C ^g)	3.6 Per Cent
Private Consumption	(C ^p)	4.3 Per Cent
Total Investment	(I)	5.4 Per Cent
Public Investment	(I ^g)	3.2 Per Cent
Private Investment	(I ^p)	6.1 Per Cent
Imports	(M)	7.0 Per Cent
Exports	(E)	7.8 Per Cent
Public Transfers	(T ^f)	5.8 Per Cent
Indirect Taxes	(T ⁱ)	6.2 Per Cent
Direct Taxes	(T ^d)	5.4 Per Cent
Exports + terms of trade Effects	(E+Z)	5.8 Per Cent

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

from 1950-1952 to 1964-1966. The implications of the worsening of the terms-of-trade on gross domestic product are interesting. If the price relationship between imports and exports had been maintained at its 1950-1952 level, the growth rate of GDP would have been 4.6 per cent a year, as compared to the actual rate of 4.4 per cent. Thus, unfavorable terms-of-trade were responsible for a reduction of GDP growth of about two-tenths of a per cent cumulatively over the period under consideration. The relevant question appears to be why Guatemala did not enjoy more growth given the satisfactory export performance even when allowance is made for the negative terms-of-trade effects. The prime culprit would seem to be the low investment ratio. Comparing the growth process of Guatemala to that of an economy with a very similar structure, i. e., Peru, is enlightening. Both countries enjoyed high export growth which was a major determinant of the level of private investment.¹ The above relationship can be explained causally as follows: a large part of private investment is either directly or indirectly channeled to the production of export commodities. High export receipts provide an incentive and stimulus for investment into export activities and related domestic activities (e. g. manufactured foodstuffs and beverages). The essential difference

¹When private investment (I^p) was regressed on exports and terms-of-trade lagged one year (E_{-1} ; Z_{-1}) highly significant statistical results were obtained in both countries. Specifically, the following two regressions were obtained over the period 1950-1966.

$$\text{For Peru: } I^p = 2887 + .773E_{-1} + .660Z_{-1} \quad r^2 = .90$$

(.077) (.291)

$$\text{For Guatemala: } I^p = -26249 + .796E_{-1} + .875Z_{-1} \quad r^2 = .83$$

(.141) (.352)

The standard errors are given in parentheses.

between these two countries is that Perú invested a much higher proportion of its GDP than did Guatemala. The investment ratio (gross investment \div GDP) grew from 16.1 per cent to 23.0 per cent in Perú over the period 1950-1965 and only from 10.3 to 11.8 per cent in Guatemala between 1950-1952 and 1964-1966. There is very little doubt that the superior growth performance of Perú over the above period (5.3 per cent) as compared to Guatemala (4.4 per cent) resulted from a much higher investment ratio. There are three major ways the investment ratio can be increased: (a) through a reduction of the growth rate of consumption; (b) through increased exports, and, (c) through import substitution. The feasibility of these alternatives will be examined subsequently in some detail.

At this point it might suffice to point out that even though the proportion of consumption expenditures to GDP is very high by international standards in Guatemala (87 per cent in 1966), the rate of growth of consumption has been even lower (4.2 per cent between 1950-1952 and 1964-1966) than that of GDP. This means that what may be called for would be a strategy to reduce consumption expenditures of the higher income classes through appropriate taxation while not squeezing further the consumption ability of the subsistence sector. Indeed it would be difficult to imagine how the subsistence sector could improve its standard of living if its consumption were to fall below its present relative level or growth rate.

Economic development consists not only of income and output growth but also of the achievement of other objectives such as employment creation, a more equal income distribution, balance-of-payments equilibrium and price stability. The performance of the Guatemalan

economy with respect to these objectives is reviewed briefly below.

Population grew at 3.1 per cent annual between the two census years (1950 and 1964) yet the economically active population grew only at an cumulative annual rate of 2.2 per cent according to census data implying clearly that the proportion of the population which is unemployed must have increased. What makes the situation particularly worrisome is that the percentage of economically active population to total population amounted to only about 31 per cent in 1964. There are some interesting sectoral and regional implications which follow from the employment and output performance. These are discussed in a subsequent section.

There is a scarcity of information on the distribution of income in Guatemala. It would appear, however, that the distribution of income has become more uneven. Guatemala is almost the prototype of a dual economy. A large subsistence sector continues to exist side by side with a dynamic commercial sector. There may be some evidence as Table 2-3 indicates that the relative population in the subsistence sector increased between 1950 and 1962 while the relative contribution of that sector to gross national product declined.

In order to evaluate the changes in income distribution between the subsistence sector and the rest of the economy eight departments were selected as being essentially in the "subsistence" sector (Chimaltenango, Sololá, Totonicapan, San Marcos, Huehuetenango, El Quiché, Alta Verapaz and Jalapa). Each of these departments is characterized by a very high proportion of its labor force in agriculture

TABLE 2-3

POPULATION AND INCOME STATISTICS: SUBSISTENCE
AND COMMERCIAL SECTORS OF THE
GUATEMALAN ECONOMY, 1950 AND 1962

	1950		1962	
	Per cent of Pop.	Per cent of GNP	Per cent of Pop.	Per cent of GNP
1. Subsistence Economy	71.3	24.0	72.7	21.9
2. Commercial Economy	28.7	76.0	27.3	78.1
a. Low incomes	21.1	24.2	20.0	20.9
b. High, medium incomes	7.6	51.8	7.3	57.2

Source: Comisión Nacional de Programación Económica reproduced in Richard N. Adams, "El Sector Agrario Inferior de Guatemala, 1944-1965, Les Problemes Agraires des Amériques Latines, (Paris, 1967).

(at least 80 per cent).¹ Tables 2-4, 2-5 and 2-6 summarize the changes in population, labor force and output in the above departments over the period 1951-1966. Some very revealing facts emerge from these tables based on official statistics. It appears that not only the share of GDP going to the subsistence sector declined dramatically from 16 per cent to 6.4 per cent of Guatemala's GDP between 1951 and 1966 (see Table 2-6) but also the absolute level of per capita output fell from 97 quetzales to

¹The census figures for Totonicapán indicate only about 30 per cent of the labor force in agriculture and about 40 per cent employed in industry. In fact, the latter are producing textile goods on a very small scale and can be considered to be in the subsistence sector. According to the official figures contained in Tables 2-4 and 2-5, per capita income in Totonicapán amounted to only 18 quetzales in 1966.

TABLE 2-4

SUBSISTENCE SECTOR:¹ GROSS DOMESTIC PRODUCT 1951-1966 IN THOUSANDS OF QUETZALES AT 1958 PRICES AND RELATIVE SHARE OF TOTAL GDP

Departments	1951	Per Cent	1964	Per Cent	1966	Per Cent
Chimaltenango	11,720	1.6	15,583	1.2	12,760	.9
Solola	7,325	1.0	5,194	.4	4,253	.3
Totonicapan	3,663	.5	3,896	.3	2,836	.2
San Marcos	42,486	5.8	31,165	2.4	31,191	2.2
Huchuetenango	16,116	2.2	16,881	1.3	12,760	.9
El Quiché	10,255	1.4	7,791	.6	5,671	.4
Alta Verapaz	21,976	3.0	18,180	1.4	17,013	1.2
Jalapa	3,663	.5	5,194	.4	4,253	.3
Total Republic	117,204	16.0	103,884	8.0	90,737	6.4

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

¹The subsistence sector is defined as consisting of the above departments.

TABLE 2-5

SUBSISTENCE SECTOR: POPULATION AND ECONOMICALLY ACTIVE LABOR FORCE IN THOUSANDS, 1950-1966

Departments	1951 ¹		1964		1966 ¹	
	Population	Active Pop.	Population	Active Pop.	Population	Active Pop.
Chimaltenango	123.5	41.9	163	48.4	169.6	49.5
Solola	84.7	27.8	111	36.1	115.7	37.6
Totonicapan	101.8	33.7	146	41.7	154.3	43.0
San Marcos	239.1	85.9	334	105.5	351.6	108.9
Huchuetenango	205.4	68.2	291	92.2	306.9	96.5
El Quiché	180.1	59.2	261	80.2	276.3	83.9
Alta Verapaz	194.6	59.4	266	79.0	278.9	82.5
Jalapa	76.7	25.3	103	30.2	107.8	31.1
Total	1205.9	401.4	1675	513.3	1761.1	533.0

Source: Dirección General de Estadística, Rep. de Guatemala, Censos 1964 Población, Junio 1966.

¹Figures for 1951 and 1966 were obtained by multiplying the census figures for the two base years 1950 and 1964, respectively, by the growth rates of population and economically active labor force by departments as indicated in the Census. The growth rates used were those prevailing over the period 1950-1964.

TABLE 2-6

RELATIVE SHARES OF SUBSISTENCE SECTOR IN GUATEMALA'S TOTAL POPULATION, ECONOMICALLY ACTIVE POPULATION AND GROSS DOMESTIC PRODUCT (IN PERCENTAGE) AND PER CAPITA GDP (IN 1958 QUETZALES), 1951-1966

Share of "Subsistence" Sector in:	1951	1964	1966
Gross Domestic Product (at constant 1958 prices)	16.0%	8.0%	6.4%
Total Population	41.9%	39.1%	38.7%
Economically Active Population	40.6%	39.0%	38.7%
Subsistence Sector Per Capita GDP (in 1958 quetzales)	97	62	51

Source: Derived from Tables 2-4 and 2-5.

51 quetzales over the same period. This downward trend would have been worse, had it not been for some outmigration from these departments (the share of population in the "subsistence" sector fell from 41.9 to 38.7 per cent of total population between 1951 and 1966).

Given the potential implications of these figures, a thorough attempt was made at determining how they were obtained. The head of the national income accounts section of the Bank of Guatemala provided all of his working sheets and methodology underlying these data. An examination of the above items indicated that output figures by department are based on departmental estimates of government revenues, total sales (as declared to the "Dirección General de Rentas") and the value of agricultural output. There appeared to be some inconsistencies in the raw data which could not be recorded, i. e., the total value of

agricultural output of a number of "subsistence" departments fell over the period 1950-1966, while production trends for major crops (corn, wheat, beans, potatoes) appeared to increase slightly in the same departments. It is quite likely that the published departmental gross domestic product figures underestimate the real output level in the series. Nevertheless it would be fairly reasonable to assume that whatever increase in output took place was more than compensated by the population growth in these eight "subsistence" departments so that per capita output actually declined. Presumably the departmental output figures do not include incomes of seasonal migratory workers earned on coffee and cotton farms in coastal departments. Since these income opportunities here increased, particularly in the sixties, they would tend to alleviate somewhat the extent of the per capita income decline in the subsistence sector as measured from the output side. It is interesting, however, to note that one study¹ arrived at estimates of per capita income for campesinos in the highlands which were of the same order of magnitude as the previously quoted national income accounts data (see Table 2-6). These estimates were based on sample surveys and interviews and yielded a per capita income of about 43 quetzales in the early sixties. Thus, even if one were to express doubt as to the accuracy of the data presented in Tables 2-4 and 2-6, there appears to be fairly strong evidence that per capita income has probably declined in the "subsistence" sector. Such a worsening of the standard of living of the subsistence sector together with a more unequal income distribution is bound to have serious economic, social and possibly political implications.

¹Lester Schmid, "The Role of Migratory Labor in the Economic Development of Guatemala" (unpublished Ph. D. dissertation, University of Wisconsin, 1967).

The balance of payments of Guatemala has undergone some pressures in the last decade. The excellent export performance, however, made it possible to limit the deficit on current account to a level generally consistent with the new inflow of long term capital. Three commodities still accounted for more than two-thirds to total exports value in 1964-1966: coffee, cotton and bananas. To some extent the spectacular export performance of Guatemala from 1960 on can be credited to cotton, the value of cotton exports increasing from about 5 million quetzales in 1960 to almost 45 million in 1966 and its relative share from 5 to 19 per cent of total exports. In the last few years exports to Central America have risen very fast amounting to more than 50 million quetzales at the present time.

The rate of growth of imports has been high compared to that of GDP (7.0 per cent compared to 4.4 per cent over 1950-1952 and 1964-1966) reflecting an elasticity of demand for imports with respect to output of 1.58 which is quite high for a developing country. Even though Guatemala's overall performance with regard to the balance-of-payments has been reasonably good, there are a number of reasons for being concerned with the country's capacity to maintain external equilibrium in the future. These factors will be discussed subsequently.

The last policy objective which is reviewed here is that of price stability. This is one area in which the economy has to be given high marks. The implicit price deflator of GDP increases from 100 in 1950 to 119.1 in 1958 and 119.0 in 1966. Thus according to the official national income data the GDP price deflator was at the same level in 1966 as in 1958. A look at the consumer and wholesale price indices confirms the amazing price stability enjoyed by the country in the last ten years. It

is clear that a high relative weight has traditionally been placed on the achievement of price stability and balance of payments equilibrium by the Guatemalan government. Guatemala's experience with price and exchange rate stability (the quetzal has been on par with the dollar since 1926) may well be unique.

In summary, Guatemala's postwar II performance can be described as one of economic stability--internally and externally--with modest output growth. It would not be unfair to say that Guatemala's economic and social development record has been poor. There is little doubt that the absolute standard of living of a large part of the population has declined. Since the size of the population and the labor force increased the number of unemployed and disguised unemployed must have risen considerably.

2.2. Quantitative Relationships Between Major Variables - A Model of the Guatemala Economy

An attempt was made at deriving a number of quantitative relationships between macroeconomic variables over the period 1950-1966 to describe and better understand the structure of the economy. A large number of regressions were run (See Appendix 2.1). It proved possible to construct a model of the Guatemalan economy which is presented below. The regressions were estimated on the basis of annual data over the period 1950-1966 (i. e., 17 observations) expressed at constant 1958 prices. The data upon which the regressions were based are given in Table 2-1 and come with a few exceptions from the National Income Accounts (Cuentas Nacionales) of the Bank of Guatemala. The estimation procedure used was ordinary least squares. Each statistically estimated relation

is given with (a) the standard error of the coefficients in parenthesis below each coefficient, and (b) the value of the coefficient of determination (r^2) and the Durbin-Watson (D. W.) test for serial correlation among residuals, respectively, on the right hand side of each equation. The model is presented in Table 2-7 and the list of variables in Table 2-8.

The model consists of six behavioral relations and five identities. The first relationship explains public transfer (T^P) as a function of gross domestic product corrected for the terms-of-trade effects (X). The relationship shows that about 1.1 per cent of additional GDP consists of public transfers. Equation 2.a reveals a good fit between indirect taxes (T^i) and GDP. It shows that about 8.9 per cent of an increase in GDP goes for payment of indirect taxes. It was not possible to obtain a significant relationship between direct taxes and other macroeconomic variables, probably because of the changes in tax coverage and rates which occurred during the period under consideration. For example, a new personal income tax was instituted in 1964 and led to a substantial jump in direct tax receipts in 1965 and 1966 compared to previous years. (See results in Appendix A).

Equations 3.a and 4.a explain public consumption (C^G) and private consumption (C^P) respectively. Government consumption changes on the average by about 5.8 per cent of a given change in GDP. The marginal (and average) propensity to consume (on private account) came out to about 83 per cent. As one would expect the coefficient of determination is very high (.99) and the standard error quite low; the Durbin-Watson ratio indicates, however, serial correlation among residuals.

A highly significant import function was obtained by regressing

departments: Escuintla and Suchitepequez. Corn production in the former remained relatively stagnant between 1950 and 1959 at an average level of about 19,550 thousand metric tons annually.¹ In 1961-1962 and 1962-1963, respectively, it rose to 60,260 and 85,330 thousand metric tons. The increase in Suchitepequez was even more dramatic, i.e., from an average level around 18,400 thousand metric tons in 1950-1959 to 113,206 metric tons in 1962-1963. The relative contribution of these two departments to total corn output grew from about 8.5 per cent in 1950-1952 to 29.8 per cent in 1962-1963. It is likely that the large production increase in these coastal departments resulted from the INTA "parcelamientos" program, through which a substantial amount of new land was put under cultivation. For the Southern Zone (Escuintla, Suchitepequez and Retalhuleu) the area under cultivation for corn rose from 64,350 hectares in 1960-1961 to 118,430 hectares in 1965-1966 and total output almost doubled from 97,244 to 193,016 thousand metric tons over the same period.² It was not possible to verify the above hypothesis regarding the role of the "parcelamientos" program in the land base and consequent corn output increase. It is conceivable that part of the increase in output was caused by land expansion of large farms in that region.

The same source (DGE) confirms the output stagnation in the "subsistence" sector which was previously discussed. Thus, for four of the eight departments (making up the traditional sector) which could

¹The figures quoted here are from the working sheets used to derive GDP by departments in the Cuentas Nacionales prepared by the Bank of Guatemala.

²Dirección General de Estadística (DGE), Estimación de Cosechas y Existencia de Ganado, 1960-1961 and 1965-1966.

be identified by zones (Sololá, Totonicapán, Huehuetenango and El Quiché) total corn output fell from 102,856 thousand metric tons in 1960-1961 to 88,826 thousand metric tons in 1965-1966 (89,148 thousand metric tons in 1966-1967). Substantial differences in yields (expressed in kilograms per hectare) are noticeable between the southern zone and the above four "subsistence" departments. The above yield amounted to about 1,646 for the former region and only about 724 for the latter throughout the period 1960-1967. In conclusion, the observed substantial jump in the growth rate of corn production in the early sixties was occasioned almost totally by an increase in the land base devoted to corn in the southern region. It does not reflect in any way a rise in output (either through acreage or yield effects) in the traditional (subsistence) sector. On the contrary, there is fairly strong evidence that output stagnated or even declined absolutely in these departments.

3.2. A Breakdown in Agriculture into Three Subsectors

There are three subsectors within agriculture which can readily be identified: agricultural exports (coffee, cotton, and bananas), traditional agriculture (corn, wheat, beans) and commercial production for domestic consumption (corn, sugar, vegetables, fruit, meat, wood and industrial crops). There is, of course, some overlap between these subsectors. Thus, traditional agriculture does not produce exclusively for self-consumption (i. e., wheat is the cash crop in the subsistence sector). Sugar is both exported and consumed domestically, thereby overlapping the agricultural export crops and commercialized domestic subsectors. Nevertheless the dividing lines are relatively sharp. Table 3-4 was constructed to show the origin of the agricultural production and its destination for the above three subsectors for 1966. It is

TABLE 3-4

ORIGIN AND DESTINATION OF TOTAL AGRICULTURAL
PRODUCTION BY SUBSECTORS, 1966, IN MILLIONS
OF QUETZALES AT 1958 PRICES

Destination of Output Origin of Output	Agricultural Exports	Traditional Agriculture	Commercial Domestic Agriculture	Total Output	Major Commodities
Agricultural Export Crops	125		10	135	coffee cotton bananas
Traditional Subsistence Agriculture Region	44 (coffee)	27 (corn beans)	10 (wheat)	81	coffee corn beans wheat
Commercial Domestic Agriculture	37 (sugar meat wood fruits)		201	238	sugar fruits livestock beef wood rubber vegetables industrial- crops
Totals by Destination of Output	206	27	221	454	

Source: Estimated on the basis of Banco de Guatemala, Cuentas Nacionales, D. G. E. and other sources.

important to note that the traditional subsector in Table 3-4 is defined regionally as consisting of the eight previously specified departments (see Chapter 2). The other two subsectors, on the other hand, are defined along crop lines. This classification provides an approximation of the actual subsectors but is not completely representative. More specifically, traditional agriculture embraces farmers in other departments besides the eight referred to previously and, conversely, the traditional (subsistence) region as defined incorporates coffee production on large fincas in San Marcos, Chimaltenango and Alta Verapaz. Coffee output on these commercial farms accrues to traditional farmers only to the limited extent of wages received by the latter. The figures given in Table 3-4 are meant to convey only rough orders of magnitude. The first row shows the output of the agricultural export crops (coffee, cotton and bananas) subsector produced outside of the eight departments which are defined as making up traditional agriculture or the subsistence sector.¹ All of the output of this subsector goes into agricultural exports, except for about ten million quetzales consisting of coffee and cotton which are used domestically. The second row indicates the output of traditional agriculture. It is important to note in this connection that some of the traditional departments produce coffee (e. g. , the three departments mentioned above produced together about 36 per cent of national coffee production in 1966). Thus, the traditional region--as defined--contributed to agricultural exports to the tune of about 44 million quetzales in 1966. The second entry (27 million quetzales) of row 2 represents mainly corn and bean production for self consumption by the traditional subsector

¹See Table 2-4 for a list of these departments.

while the third entry (ten million quetzales) represents cash sales to the commercial domestic subsector and consists of wheat and some other minor products. The total agricultural output of the traditional region was estimated at about 81 million quetzales in 1966. The third row provides production estimates of the commercial domestic subsector. About 37 million quetzales worth of commodities such as sugar, meat, wood products and fruits went into agricultural exports,¹ and 201 million quetzales went into domestic consumption. The "total output" column reveals the very modest level of production of the traditional sector-- 81 million quetzales out of a total agricultural output of 454 million quetzales (i. e. , about 18 per cent).

The last row of Table 3-4 indicates from left to right, respectively, the total value of agricultural exports (206 million quetzales), the truly "subsistence" part of the agricultural output of the traditional region (the production for self-consumption, i. e. , 27 million quetzales) and that part of commercial domestic agriculture which was destined for domestic consumption. Agricultural consumption within the traditional agricultural region is larger than the above-indicated 27 million quetzales since that subsector presumably uses part of the income it earns from wheat and coffee sales to purchase additional food--including corn--from other regions. Furthermore, the output of subsistence farmers outside of the eight departments comprising the "traditional region" should be added to the above figure to obtain the true output of traditional agriculture.²

¹It should be noted that the row heading (agricultural export crops) differs from the column heading (agricultural exports). The former covers only coffee, cotton and bananas, whereas the latter includes all agricultural exports.

²It also implies that the output of the commercial domestic agricultural subsector should be reduced accordingly since under the selected taxonomic scheme production by the subsistence farmers outside the altiplano is included in commercial domestic agriculture.

3.3. Contribution of Agriculture to the Balance of Payments

As is fairly typical of many developing countries, Guatemala's agricultural sector is the predominant foreign exchange earner. The share of agricultural exports in total exports has gone from over 90 per cent in the fifties to about 81 per cent in 1966. Table 3-5 gives the commodity composition of exports by major commodities over the period 1952-1966. The table reveals clearly the relative importance of three commodities (coffee, cotton and bananas) in total exports. These three commodities combined accounted for around 90 per cent of the current value of exports in the fifties. This share declined gradually throughout the sixties--amounting to 67 per cent in 1966. Both coffee and bananas underwent a large relative decline while cotton proved to be the success crop of the postwar II period with exports skyrocketing from nothing in the early fifties to almost 45 million quetzales in 1966 (i.e., 19 per cent of total exports value). The relative loss of coffee and bananas has been made up by a variety of other agricultural products and semi-manufactured exports. The previously observed fall in the share of agricultural to total exports is a very recent phenomenon which reflects largely the opening up of the Central American Common Market to Guatemala's industries.

A relevant question to ask is what has been the net contribution of the agricultural sector to the trade balance.¹ In order to answer this question Table 3-6 was prepared. It estimates the foreign exchange earnings from agricultural exports and the foreign exchange expenditures

¹It would be even more relevant to try to determine the overall contribution of agriculture to the balance of payments as a whole. This did not prove to be feasible because of the differences involved in identifying the foreign capital flows into and out of agriculture.

TABLE 3-5
 COMMODITY COMPOSITION OF EXPORTS
 (Percentage of Current Value)

Year	Total	Coffee	Bananas	Cotton	Oils	Wood	Chicle	Others
1952	100.0	81.8	5.4	--	1.4	0.9	2.0	8.5
1953	100.0	76.7	14.1	--	0.9	0.7	--	7.6
1954	100.0	77.5	11.6	3.8	0.9	0.5	0.5	5.2
1955	100.0	76.5	9.5	4.6	1.1	0.5	1.4	6.4
1956	100.0	79.0	8.0	4.2	2.0	0.5	0.9	5.4
1957	100.0	75.6	8.7	3.9	2.5	0.4	1.0	7.9
1958	100.0	76.0	8.4	5.4	1.3	0.4	0.9	7.6
1959	100.0	74.8	9.7	4.1	0.6	0.5	1.5	8.8
1960	100.0	69.8	11.9	5.2	0.7	0.8	1.7	9.9
1961	100.0	62.8	10.4	9.5	1.2	0.8	2.1	13.2
1962	100.0	59.6	5.5	13.5	2.6	1.0	0.5	17.3
1963	100.0	50.0	7.5	16.2	1.5	0.2	0.7	23.9
1964	100.0	43.0	5.7	18.0	1.3	1.0	0.7	30.3
1965	100.0	47.5	2.3	19.0	1.0	1.1	0.8	28.3
1966	100.0	43.4	4.5	19.2	0.7	0.5	0.1	31.6

Source: Dirección General de Estadística.

TABLE 3-6
 CONTRIBUTION OF AGRICULTURAL SECTOR TO BALANCE OF
 TRADE (Millions of Quetzales at Current Prices)

	1956	1964	1966
Agricultural Exports	118.6	157.9	187.0
Imports of Agricultural Products and Inputs for Sector	-28.8	-41.8	-37.9
Estimated Balance	89.8	116.1	149.1

Source: Banco de Guatemala, Estadísticas del Sector Externo.

for agricultural imports and inputs for three years: 1956, 1964, and 1966.

It is probable that the above estimates of the net contribution of the agricultural sector to the trade balance may be too high since not all imported inputs destined for the agricultural sector could be identified. Nevertheless, it is evident that the agricultural sector was by far the largest contributor to the previously described strength of Guatemala's balance-of-payments over the last two decades. The fairly bleak prospects which coffee and cotton are facing on the world demand side make it very unlikely that these crops can continue to be the dynamic and propulsive forces in the growth of the overall economy. At the same time it does not appear that any other agricultural export crop-- or set of crops--loom in the horizon to supplement coffee and cotton foreign exchange earnings. Some potential exists for increased exports of meat, fruits and vegetables to Central America and even to the

United States. However, a realistic appraisal of the demand prospects would have to be relatively bearish at this time.

3.4. Agricultural Contribution to Employment

It has already been pointed out that about two-thirds of the labor force (i. e. , economically active population) is engaged in agriculture. A slight decline in that share occurred between 1950 and 1964 from 68.2 to 65.4 per cent, while the absolute size of the labor force in agriculture rose from 659 thousand to 861 thousand. Thus, while agriculture contributes only about 30 per cent of GDP it employs 65 per cent of the labor force. The census figures indicate furthermore that the eight departments constituting the "subsistence" subsector employed 409 thousand people in agriculture in 1964. The stagnating--if not declining--output level in that subsector combined with a high rate of growth of population (only slightly alleviated by migration) has in all probability pushed down per capita output in the last decade. Since many Highlands Indian minifundistas were facing increasing difficulties in scraping even a subsistence income from their very small holdings (see Chapter 4 for data on farm size), seasonal migration to the large commercial farms in the Southern region has become larger. A detailed study of this question¹ estimated that annually between three and four hundred thousand workers migrate from their homes--mainly in the subsistence Highlands departments to coffee, cotton and sugar fincas in the southern region. There appears to be a natural complementarity between harvest time

¹Lester Schmid, *The Migratory Labor in the Economic Development of Guatemala*, (unpublished Ph. D. dissertation, University of Wisconsin, 1967).

in the altiplano and the large commercial farms in the south. It has been estimated that the campesino with between 0.5 and 2.5 hectares of land is employed on his farm from 50 to 70 days a year.¹ Other sources have placed labor requirements to cultivate 1.7 hectares at about 100 men-days.² Harvesting in the Highlands is completed by September after which time the small campesinos have no employment alternative on their own or neighboring farms. Farmers with 1.7 hectares would be entirely free from working on their own farms from the middle of August to the end of December. They can, thus, work on the coffee fincas at no "opportunity cost" since the months of September to November are the main months of coffee harvest. There is somewhat more conflict between corn production in the altiplano and work on cotton farms in the South because of the later harvest for cotton than for coffee.

Schmid has shown that the income earned by migratory workers on the commercial farms was an essential supplement to their meager subsistence income. The annual per capita income of the migratory workers from all sources appeared to be slightly higher than that of the non-migratory campesinos: about 60 quetzales per capita compared to 43 quetzales. It is very difficult to compare these figures given the problems of imputing values a) to non-monetary services such as food

¹George Hill and Manuel Gollas, "Study of the Minifundia of the Highlands of Guatemala" (Guatemala: unpublished materials, 1964).

²Charles Wagley, "Economics of a Guatemalan Village," American Anthropologist, No. 48, 1941; J. Appelbaum, "Migraciones Temporales en San Idelfonso Ixtahuacan: Sus Causas y Consecuencias," Public and International Affairs, Vol. IV, Spring, 1966.

and housing received by the migratory workers on the fincas and b) to subsistence output. In any case, income earned by migratory workers is becoming a more important--almost crucial--element in their survival. The prospects for increased demand for migratory workers on coffee, cotton and sugar farms in the South appear bleak given the limited world demand for these export crops and the trend towards mechanization in cotton production. The consequences of a leveling-off or decline in these employment alternatives for the traditional subsector could be extremely serious. It reinforces the case for policies and resource allocations designed to increase output in the subsistence sector itself and to concentrate particularly on techniques which tend to be labor-intensive. It can be hypothesized that the best development strategy for Guatemala is not through an outflow of labor and capital from the traditional region or even the whole of traditional agriculture to industry and commercial agriculture but through increasing commercialization of the subsistence sector itself. This is particularly true in the light of the limited prospects for exports and consequently the limited productivity of new resources applied to the production of agricultural export crops and the small labor-absorptive capacity of non-agricultural output.

3.5. The Need for Different Policies Designed for the Three Agricultural Subsectors

It has been seen that in Guatemala even more than in other developing countries agriculture is not a homogenous sector. At least three subsectors can be readily distinguished and identified: traditional agriculture in the Highlands (corn, beans, wheat) as well as in other

parts of the country; agricultural export crops (coffee, cotton, bananas) and commercial agriculture mainly for domestic consumption (most remaining products). The conditions underlying production demand and marketing differ sharply as between these subsectors as many parts of this study illustrate.

The significance of the above phenomenon from the standpoint of policy formulation is that the latter only makes sense at the subsectoral level. It is not meaningful to talk about a unified national agricultural policy but it is meaningful to design policies for and allocate public resources to each subsector. In a sense, given limited resources, these subsectors compete with one another. In the past, it appears that the agricultural export crops and to a somewhat lesser extent the commercial agricultural sector for domestic consumption received the great bulk of attention and resources. This strategy reflected the high relative weights placed on objectives such as balance-of-payments equilibrium, price stability and static economic efficiency (the maximization of output in the short run) as well as the prevailing payoffs applying to these objectives (e. g. , the effect of resources used on the level of achievement of these objectives). At the same time relatively low weights were placed by the government--with the possible exception of the period of the forties and early fifties--on a more equal income distribution and employment creation. The payoffs have changed, and conceivably the relative importance of the above objectives in the preference scheme of the policy maker as well. Export prospects for coffee and cotton appear much less favorable, thereby reducing the payoff of resources allocated to that subsector in terms of contribution to the balance-of-payments and overall output. On the other hand, the standard of living

of people in traditional agriculture appears to have dropped while new and simple technologies are becoming available which may have the effect of increasing the output payoff per unit of resources.

It appears to us that a relatively strong case can be made for a larger share of resources being directed to traditional agriculture than in the past. This means that a plan for the development of the traditional region in the Highlands and perhaps also for traditional farmers in other departments should be designed. We realize that the empirical evidence which can be brought to bear in support of this strategy is quite limited and inadequate in parts. We believe, however, that the long run economic and political cost of taking a "wait and see" attitude pending the generation of better information upon which to make decisions, may be much higher than the present cost of programs recommended in this study to help develop the Highlands and other subsistence pockets.

CHAPTER 4

STRUCTURE OF THE AGRICULTURAL SECTOR

Guatemala has such a wide diversity of topography, climates and soils that favorable conditions can be found within the country for the production of almost any agricultural product. This great variation presents a large number of difficult problems in land use; at the same time it provides unusual opportunities for a productive and diversified agricultural economy. This chapter is concerned with the organization of agricultural production which has developed in Guatemala. How many farms and farmers are there? How large are the farms and what crops are produced? Are most farms owner-operated or operated by hired managers and tenants? How productive are land and labor resources? Are farm size and tenancy related to resource productivity? Answers to these questions are essential for identifying policies and programs to accelerate agricultural development.

Most of the data in this chapter were tabulated from the agricultural census of 1964. It is unfortunate that the results of that census are as yet largely unpublished. Analysis of complex and controversial issues involving land ownership and utilization requires timely and accurate information. The primary purpose of this chapter is to use the available data to identify the important problems in resource use and structure and to point out some of the major implications for development policies and programs.

4.1. Agricultural Systems

Guatemalan agriculture is carried on largely within two major farming systems: a large-scale, commercial or plantation type agriculture and a small-scale, subsistence-type agriculture. While there is considerable variation within these two general systems, the leading characteristics of each are briefly described below.

4.1.1 Commercial Agriculture

This sector is oriented primarily toward the production of cash crops for export and beef cattle. Coffee, cotton and bananas are the major export crops produced. Sugar and beef cattle are produced both for the domestic market and export. Other products of lesser importance include essential oils, dairy and poultry.

Coffee is the outstanding plantation crop and is more important to Guatemala in terms of income and exports than any other agricultural product or industry. Some coffee is produced in almost every department of the Republic but the vast majority is grown in the upper Pacific piedmont and the Coban region of the northern slopes. The coffee lands in the Pacific piedmont extend from Mexico on the west to the department of Santa Rosa on the east. Climate, altitude and soil conditions are excellent for production of high-quality coffee in this area. The Coban district is smaller and of lesser importance as a coffee-producing area.

Cotton has emerged in recent years as the second leading crop of commercial agriculture. Cotton is produced mainly in the Pacific coastal plain and lower piedmont. It is a large-scale enterprise, highly capitalistic in nature, which utilizes modern methods, including

machinery, improved seeds, fertilizers and insecticides. Large amounts of credit are required.

Banana production is less important now than it was earlier. Disease and other production problems have reduced production on the Pacific coast. Some expansion has recently taken place in the department of Izabal near the Caribbean coast on the north.

Sugar production in plantation agriculture is devoted to refined sugar processed through a few large mills. The refined sugar comes from sugar cane grown on plantations situated mostly in the lower Pacific piedmont area and concentrated in the department of Escuintla. Although sugar cane is still cut by hand, planting, cultivating and hauling operations are largely mechanized. Sugar production has increased slightly in recent years largely in response to higher United States quotas.

Commercial production of cattle is concentrated on large farms. These are located on the Pacific coastal plain and along the eastern border of the country. Production has recently been increasing in the Caribbean lowlands of the department of Izabal. Cattle production appears to be carried on at a low technical level. Little attention is given to pasture improvement, good breeding practices or control of parasites and diseases. Practically the entire production is grass fed. More efficient production has recently been stimulated in some areas by the development of exports of chilled and frozen beef.

While producers of some crops and some producers of other products use modern methods and improved technology, many of the large farms in the commercial sector appear to be farmed neither intensively nor efficiently. There is a high degree of absentee ownership.

Owners live in the city and visit their farms--whose operations have been turned over to hired managers--only occasionally. The large farms are also wasteful of land; they encompass much more land than is used regularly for production. Production methods are often backward and at a low level of technology. Production is largely organized around the use of large numbers of resident laborers and migratory workers. How best to insure intensive and efficient utilization of large holdings is a question of major importance in Guatemala. This chapter will investigate the extent to which these criticisms can be supported by data from the 1964 census; alternatives for seeking improvements will be discussed in Chapter 9.

4.1.2. Subsistence Agriculture

Subsistence agriculture is carried out by the individual families on small plots wherever they live. Since a large part of the population lives in the central region, this is the location of most of the subsistence farming. However, there is a growing number of subsistence farms in the coastal region. Production in subsistence agriculture is carried out with primitive techniques using hand labor and a low level of technology. There is a lack of rotation of crops and much of the land is depleted and eroded.

Corn is the basic product of the subsistence sector. It is the most widely cultivated of all crops and is the staple food grain in the diet of the Guatemalan people. Nearly every farm family cultivates its own small cornfield (milpa). Most corn is produced from native, low-yielding varieties and much of it on land not particularly well-suited to the crop. It is planted on steep mountain slopes and on soils exhausted

from centuries of cultivation. It is attacked by diseases and pests and wasted through primitive harvesting and storage methods. As a result, yields are low and possibly declining where the dependence on corn for survival is greatest.

Beans are another major crop of the subsistence sector; often they are interplanted with corn in the same field. Beans, like corn, form a basic part of the diet and they supply important protein. Production is carried on with most of the same deficiencies as exist for corn.

Some subsistence farmers have a few head of cattle for production of meat and milk for domestic use. More commonly, hogs and poultry are found on small farms. Little has been done, however, to build up production for market purposes. Breeds are poor, feeding is deficient and production is very limited.

A number of other products are produced mainly for the market by the subsistence sector. Wheat production is a good example. It is concentrated on small farms in the southwestern part of the highlands where it is planted and harvested largely by hand. Vegetables are grown on small farms in the vicinity of Lake Atitlan in the highlands. Sheep production is concentrated in small farm flocks found in the western highlands of the central region. Numerous varieties of fruits are grown in tropical and temperate regions but mostly in small quantities which are sold for local consumption.

Since these products are grown mostly on small farms using primitive techniques and with low output per man and per hectare, their producers form part of the subsistence sector. A farmer and his family who produce a few hundred-weight of wheat for sale each year constitute a subsistence unit as much as those who produce corn

largely for home consumption. The same holds true for farmers who market small quantities of fruits and vegetables.

Problems in the subsistence sector are much different than in the export sector. The basic problem is poverty, a condition rooted in the structure of small farms, the use of primitive methods of production, the existence of underemployment and the pressure of population growth. Such conditions pose the most difficult possible situation for agricultural change and development.

4.2 Number and Size of Farms

According to the agricultural census of 1964, 417,344 farm units existed in Guatemala. A farm was taken to be any technical unit producing crop or animal products regardless of size. A farm comprised all parcels of land under the same management. Plots of land assigned to resident farm laborers on large farms for food production were counted as separate technical units.

The number of farms in 1964 was considerably higher than the 348,687 farms listed by the census of 1950. A large part of this difference is due to the fact that in 1950 a farm was defined with a minimum size restriction of one cuerda (about 0.04 of a hectare). As a result, many of the very small farms listed in 1964 would not have been counted as farms in 1950. Also, the 1964 census listed fewer farms in the largest size categories. It is not known if this difference represents an actual decline or reflects misclassification due to under-reporting of holdings by large landowners in the latter census.

The 417,344 farms listed in the 1964 census included a total of 3,442,520 hectares. This is approximately 32 per cent of the total area in the country. This figure is, however, lower than the 3,720,800

hectares in farms as reported by the 1950 census. This difference is due entirely to the lower area reported by the very large farms in 1964. While some of this decrease could be accounted for by the reported decrease in the number of very large farms between 1950 and 1964, it is probable that there was considerable under-reporting of sizes of large farms in the latter census.

In Table 4-1A, the 417,344 farms listed by the 1964 census are classified by size. Five size classifications are used, following a system which has been made popular in Latin America by CIDA and other regional groups.

The two smallest size groups, including all farms of less than seven hectares, represent the minifundio. They are diminutive in size but large in number. Their size is insufficient to fully employ the farm family and produce enough income for family necessities. In 1964, there were a total of 364,880 such farms in the country. This group constituted 87 per cent of the farms but controlled only about 19 per cent of the total land in farms. The average size for these two classes taken together was less than two hectares per farm.

At the other end of the size scale are two groups of large farms (more than 45 hectares each). These farms represented slightly less than 3 per cent of the farms in number but contained more than 60 per cent of the total land in farms. The average size for these large farms was almost 250 hectares per farm.

There are comparatively few farms that fall in between the small and large extremes, the medium-sized farms which are roughly comparable to "family farms" in the United States. These farms are large enough to fully employ the farm family and to produce a sufficient

TABLE 4-1A
GUATEMALA: NUMBER, SIZE AND FRAGMENTATION OF FARMS, 1964

Farm Size Class	Number of Farms	Per cent of Farms	Area	Per cent of land in Farms	Average Size	Average Number of Parcels Per Farm
Less than 0.70 hectares	85,083	20.0	32,619.2	0.9	.38	1.2
From 0.70 to 6.99 hectares	279,797	67.0	607,855.6	17.7	2.17	1.6
From 6.99 to 45.13 hectares	43,656	10.0	648,900.2	18.8	14.86	2.1
From 45.13 to 902.51 hectares	8,420	2.0	1,258,545.2	36.6	149.47	1.8
More than 902.51 hectares	388	0.9	894,600.4	26.0	2,305.67	1.5
Guatemala	417,344	100.0	3,442,520.6*	100.0	8.25	1.6

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

*Represents 31.6 per cent of the total area of the country (10,888,900 hectares).

income to provide a minimally adequate level of living. Considered as farms from 7 to 45 hectares, this group included 10 per cent of the farms representing 19 per cent of the total land in farms in 1964. The average size for this class was about 15 hectares.

As would be expected from the size distribution which has been described, the overall average size of farm in the country was low-- only 8.25 hectares per farm. In addition, more than 90 per cent of all farms in the country were smaller than this average size.

The problem of "minifundismo" is compounded in some countries with fragmentation; small farms are composed of several postage-stamp plots in various locations. The problem of fragmentation does not appear to be serious in Guatemala. In 1964, the majority of farms in all size classes consisted of a single parcel of land (Table 4-1A). Indeed, the average number of parcels per farm was highest for the middle sized farms and was slightly higher for the larger farms than for the smaller size classes.

Comparable information on the number and size of farms by region is shown in Tables 4-1B, 4-1C and 4-1D. The coastal region contained less than 15 per cent of the farms but about one-third of the total land in farms. The central region contained more than 80 per cent of the farms in the country and slightly less than two-thirds of the land in farms. Less than one per cent of the farms and land in farms were located in the Peten region.

The inequality in farm size was somewhat greater in the coastal region than elsewhere in the country. There, only 4 per cent of the farms controlled more than 80 per cent of the land (Table 4-1B). At the other end of the scale, almost 85 per cent of the farms in this region

TABLE 4-1B

COASTAL REGION: NUMBER, SIZE AND FRAGMENTATION OF FARMS, 1964

Farm Size Class	Number of Farms	Per cent of Farms	Area	Per cent of land in Farms	Average Size	Average Number of Parcels Per Farm
Less than 0.70 hectares	19,365	28.3	7,225.0	0.6	0.37	1.1
From 0.70 to 6.99 hectares	38,427	56.0	72,389.3	6.5	1.88	1.3
From 6.99 to 45.13 hectares	8,143	11.9	135,495.8	12.1	16.64	1.4
From 45.13 to 902.51 hectares	2,384	3.5	448,381.2	40.0	188.08	1.4
More than 902.51 hectares	190	0.3	456,310.4	40.8	2,401.63	1.3
Coastal Region	68,509	100.0	1,119,801.7*	100.0	16.35	

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

*Represents 54.0 per cent of the total area of the region (2,074,300 hectares).

TABLE 4-1C
CENTRAL REGION: NUMBER, SIZE AND FRAGMENTATION OF FARMS, 1964

Farm Size Class	Number of Farms	Per cent of Farms	Area	Per cent of Land in Farms	Average Size	Average Number of Parcels Per Farm
Less than 0.70 hectares	54,544	19.0	25,373.2	1.1	0.39	1.3
From 0.70 to 6.99 hectares	239,383	69.1	530,392.8	23.0	2.22	1.7
From 6.99 to 45.13 hectares	35,281	10.2	509,877.9	22.1	14.45	2.2
From 45.13 to 902.51 hectares	6,011	1.6	807,050.4	34.9	151.94	2.0
More than 902.51 hectares	196	0.1	435,428.0	18.9	2,221.57	1.7
Central Region	346,526	100.0	2,308,122.3*	100.0	6.66	1.7

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

*Represents 44.1 per cent of the total area of the region (5,220,200 hectares).

TABLE 4-1D
 PETEN REGION: NUMBER, SIZE AND FRAGMENTATION OF FARMS, 1964

Farm Size Class	Number of Farms	Per cent of Farms	Area	Per cent of Land in Farms	Average Size	Average Number of Parcels Per Farm
Less than 0.70 hectares	63	2.7	21.0	0.1	0.33	1.1
From 0.70 to 6.99 hectares	1,987	86.1	5,073.5	34.8	2.55	1.3
From 6.99 to 45.13 hectares	232	10.0	3,526.5	24.2	15.20	1.2
From 45.13 to 902.51 hectares	25	1.1	3,113.6	21.3	124.54	1.1
More than 902.51 hectares	2	0.1	2,862.0	19.6	1,431.00	1.0
Peten	2,309	100.0	14,596.6*	100.0	6.32	1.3

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

*Represents 0.41 per cent of the total area of the region (3,585,400 hectares).

can be classed as "minifundio;" this large group controlled only about 7 per cent of the land in farms. Also, the percentage of farms in the very smallest size class is larger in this region than elsewhere. These units largely represent farmers who work permanently or seasonally on large farms but who also have their own subsistence plots. The number of these units in the coastal region is thought to be rising due to population growth and migration from other areas. Small farms are smaller on the average in the coastal region than elsewhere in the country.

The notable difference in the central region from the overall pattern is the larger percentage of farms and farmland in the second smallest size class. The highlands are the home of the dense Indian population distributed over small farms. About two-thirds of the farms and almost one-fourth of the land was represented by this group in the central region in 1964. Population growth has meant continuing pressure for growth in the number and decrease in size of small farms in this region. It can also be noted that more than three-fourths of the farms classified as "middle-sized" were located in this region. Although less than 2 per cent of farms in this region were classed as "large" they controlled more than 40 per cent of the land in farms.

By eliminating the smallest and largest size classes, for which comparable data were not available, some comparisons between 1950 and 1964 were possible. The most important change is the increase in the number of small farms in 1964. There were about 20 per cent more such farms listed in the latest census and this increase occurred both in the coastal and central regions. One striking difference, however, is that the increase in the coast did not result in a decrease in the average size of farm in the class. In the central region,

in contrast, the average size of small farm declined by almost 50 per cent. The process in the central region represented the subdivision of existing farms into a larger number of smaller units. In the coast, to a great extent new farms were formed by bringing new land into production. If the rate of population growth remains high, pressures will continue to subdivide holdings in the settled area. Farm sizes will further decline especially in the central region but also in the coast as new land becomes scarce. Thus, problems of labor absorption and productivity are likely to become more critical in Guatemala's agricultural sector in the future.

4.2.1. Agricultural Development Zones (Parcelamientos)

The settlement areas administered by the National Institute for Agrarian Transformation (INTA) are an important element in the farm sector, especially in the coastal region. These zones were initiated following the shift in agrarian policy in 1954 from land redistribution to colonization. Most of the zones were settled in the 1953-1963 period; there has been little settlement of new families in recent years. This program has been carried out under an agency charged with integral economic and social development of the colonization zones.

Initially, the zones were located largely on the South Coast. Later, colonization projects were initiated in the departments of Izabal on the north coast and Alta Verapaz in the north (Figure 4-1). A recent resume of the number of families who have been given parcels, the modal size of parcel, and the total areas involved in the colonization zones is given in Table 4-2. Most parcels are considerably larger than the small farms in the same area. Apparently, the policy has been to form "family-sized" farms in the development zones.

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TABLE 2-7
 BEHAVIORAL RELATIONSHIPS IN GUATEMALA:
 MODEL I

Behavioral Relationships		
1. a	$T^r = -2853 + .0108X$ (1244) (.0012)	$r^2 = .84$ $d = 1.123$
2. a	$T^i = -20034 + .0889X$ (6179) (.0061)	$r^2 = .93$ $d = .8216$
3. a	$C^g = 10895 + .0583X$ (6798) (.0067)	$r^2 = .84$ $d = .9407$
4. a	$C^p = .8289X$ (.0043)	$r^2 = .99$ $d = .7435$
5. a	$M = -73773 + .177C + .636I$ (11089) (.019) (.106)	$r^2 = .97$ $d = 1.469$
6. a	$I^p = -26249 + .7960\bar{E}_{-1} + .8749\bar{Z}_{-1}$ (19903) (.1408) (.3517)	$r^2 = .83$ $d = 1.33$
Identities		
7. a	$S^g = T^i + \bar{T}^d + \bar{T}^o - C^g - T^r \quad (T^i + \bar{T}^d + \bar{T}^o = C^g + T^r + S)$	
8. a	$I^g = S^g + \bar{F} - \bar{I}_f^g$	
9. a	$C = C^p + C^g$	
10. a	$I = I^p + I^g$	
11. a	$X = C + I + \underline{\Delta S} + \underline{\bar{E}} + \underline{\bar{Z}} - M$	

total imports (M) on consumption (C) and investment (I). (See 5. a) The function shows that about 18 per cent of additional consumption and about 64 per cent of additional investment are, respectively, imported. The relatively high import component of investment is, of course, caused by the limited domestic production of capital and other investment

TABLE 2-8
LIST OF VARIABLES

T^r Transfers	I Total Gross Investment
T^i Indirect Taxes	M Imports of Goods and Services
T^d Direct Taxes	M^c Imports of Consumer Goods
T^o Net Non Tax Public Income	M^i Imports of Investment Goods
C^p Private Consumption	S^g Public Savings
C^g Public Consumption	F Internal and External Public Loans
C Total Consumption	E Exports of Goods and Services
X Gross Domestic Product	E_{-1} Exports of Goods and Services
X^p Disposable Product	Z Terms-of-Trade Effects Lagged One Year
I^p Private Gross Investment	Z_{-1} Terms-of-Trade Effects Lagged One Year
I^g Public Investment	ΔS Changes in Stocks
I^g_I Financial Investment and Amortization of Public Debt	

goods. There is no evidence that import-substitution has reduced the import component of investment more than marginally over the last two decades. The high dependence on imports which domestic investment entails illustrates the conflict which exists between growth induced by investment, on the one hand, and balance of payments equilibrium on the other.

The next relationship (6. a) provides a reasonably good explanation of the changes in private investment (I^p) as a function of exports and the terms-of-trade effects, both lagged one year (E_{-1} , Z_{-1}). Given the

erratic changes in private investment over the period under consideration, it is interesting that as much as 83 per cent of the variations in I^P would be explained by changes in E_{-1} and Z_{-1} ($r^2 = .83$). This relationship-- which has previously been referred to--can be interpreted causally as follows. Export receipts and changes in the terms-of-trade are the dynamic variables in the economy. Not only is the export sector large in relation to GDP ($E + Z \div X = 19$ per cent in 1966) but it also provides the stimulus to invest either directly by encouraging re-investment in the export activities or indirectly by generating new funds for general investment purposes. Growth in Guatemala appears to have been export-led. The magnitudes of the coefficients in equation 6.a are revealing, i.e., a one unit change in last year's exports (E_{-1}) leads to about eight-tenths of a unit change in current private investment. Thus, private investment appears to be quite sensitive to changes in exports.

The remaining equations in the system are definitional. Equation 7.a defines government savings (S^G) in terms of government revenues on current account from all sources [indirect taxes (T^i) plus direct taxes (T^d) plus other public revenues (T^o)] minus government consumption (C^G) and public transfers (T^T). Equation 8.a defines public investment (I^G) as equal to government savings plus net internal and external public loans (\bar{F}) minus so-called public financed investment (\bar{I}_f^G). This identity is consistent with the way Guatemala's public accounts are consolidated. The next two relationships (9.a and 10.a) define total consumption (C) and investment (I), respectively, as the sum of their private and public components. Finally, the last relationship is the familiar gross domestic product identity, where $\bar{\Delta S}$ indicates changes in stocks.

Figures 2.1 to 2.5 illustrate graphically the actual values of the dependent (endogenous) variables compared to the estimated values obtained from the regressions 2.a to 5.a. It can be seen that the regressions describe relatively well the course of these variables. It is particularly relevant to notice that turning points are well predicted by both the import function and the private investment function.

The relationships in the above model (particularly the behavioral ones) can be used independently to explain the major determinants of key variables such as indirect taxes, imports and private investment and project changes in these dependent variables as a function of anticipated changes in the independent variables. Alternatively the whole set of relations can be considered as a model of the economy in which case the set of endogenous variables (all the variables of the left hand side of the equality sign in Table 2-7) is explained by changes in the exogenous variables, i.e., those variables which are presumed to be determined outside the system. Thus in model I in Table 2-7 the following breakdown appears:¹

Endogenous Variables: T^F , T^I , C^G , C^P , M , I^P , S^G , I^G , C , I , X

Exogenous Variables: \bar{E}_{-1} , \bar{Z}_{-1} , \bar{E} , \bar{Z} , \bar{T}^d , \bar{T}^o , \bar{T}^g , $\bar{\Delta}_S$, \bar{F} .

When the reduced form is obtained it is possible to show the quantitative effect of changes in the set of exogenous variables on the set of endogenous variables. It is interesting to note, in this respect, that the import multiplier of exports (E) and the terms-of-trade effects

¹ Exogenous variables are denoted by a bar above the symbol.

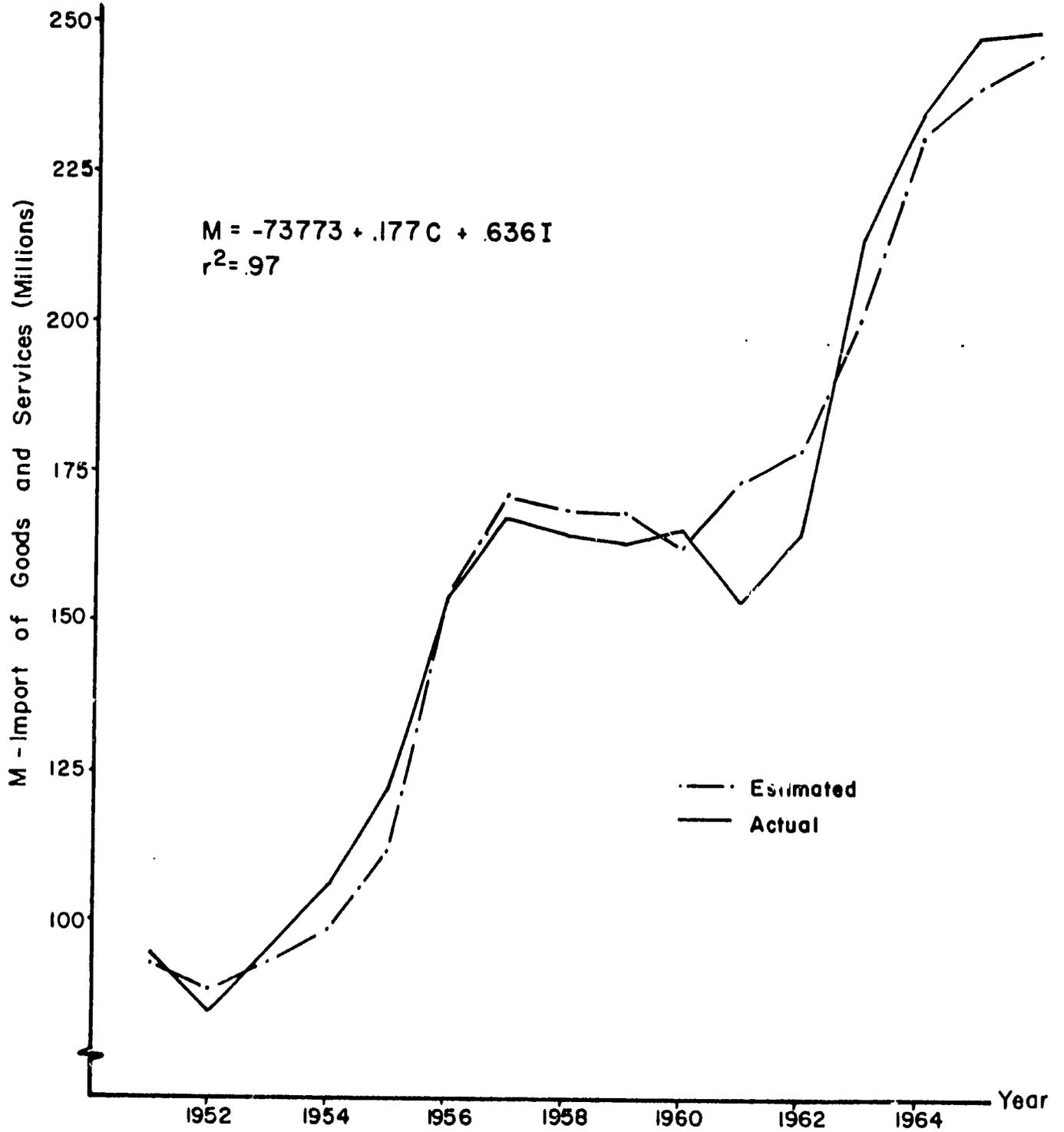


Figure 2.1 Regression - Imports of Goods and Services on Total Consumption and Total Investment Plotted against Time

11

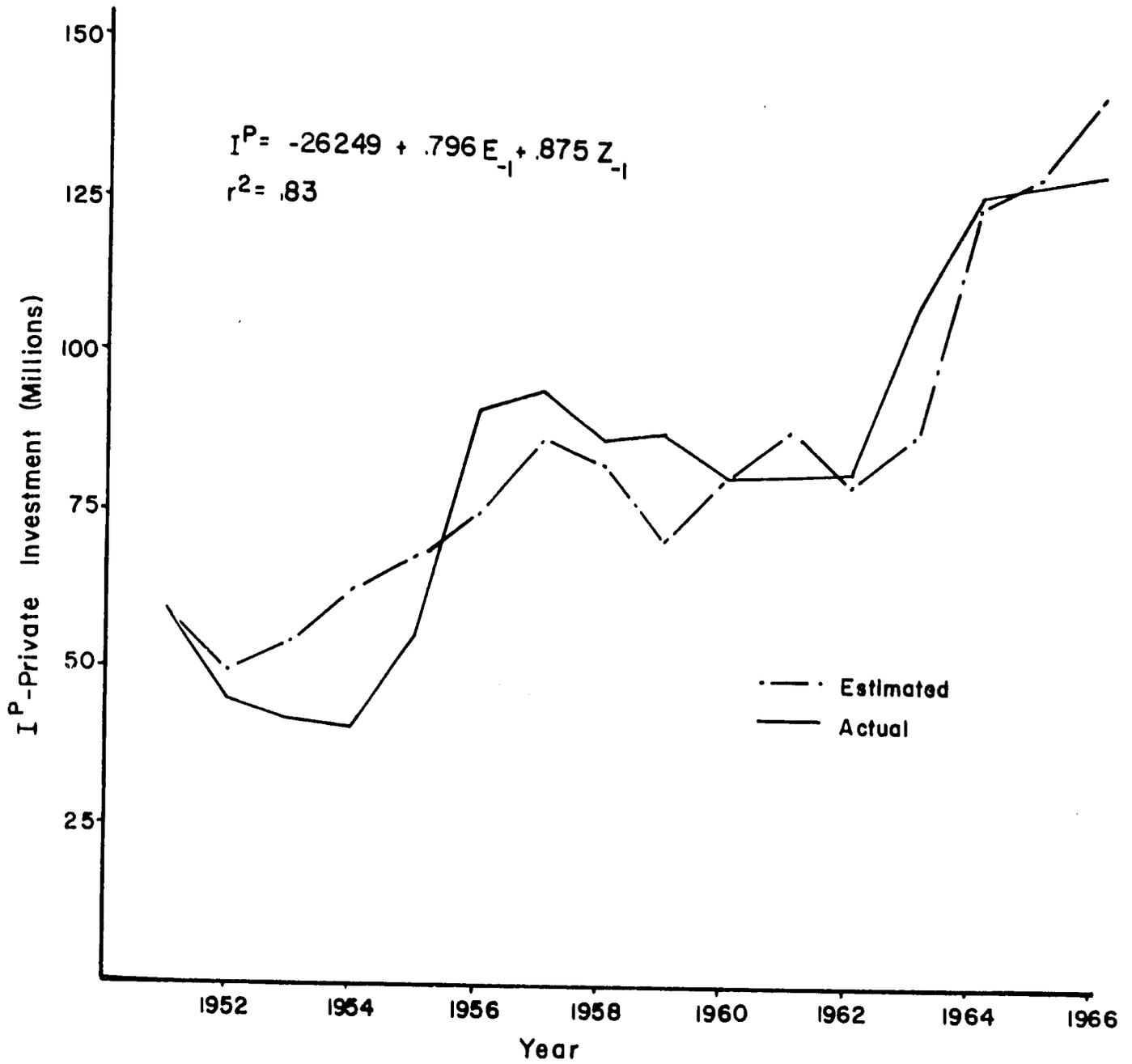


Figure 2.2 Regression - Private Investment on Lagged Exports and Lagged Terms of Trade Effect Plotted against Time

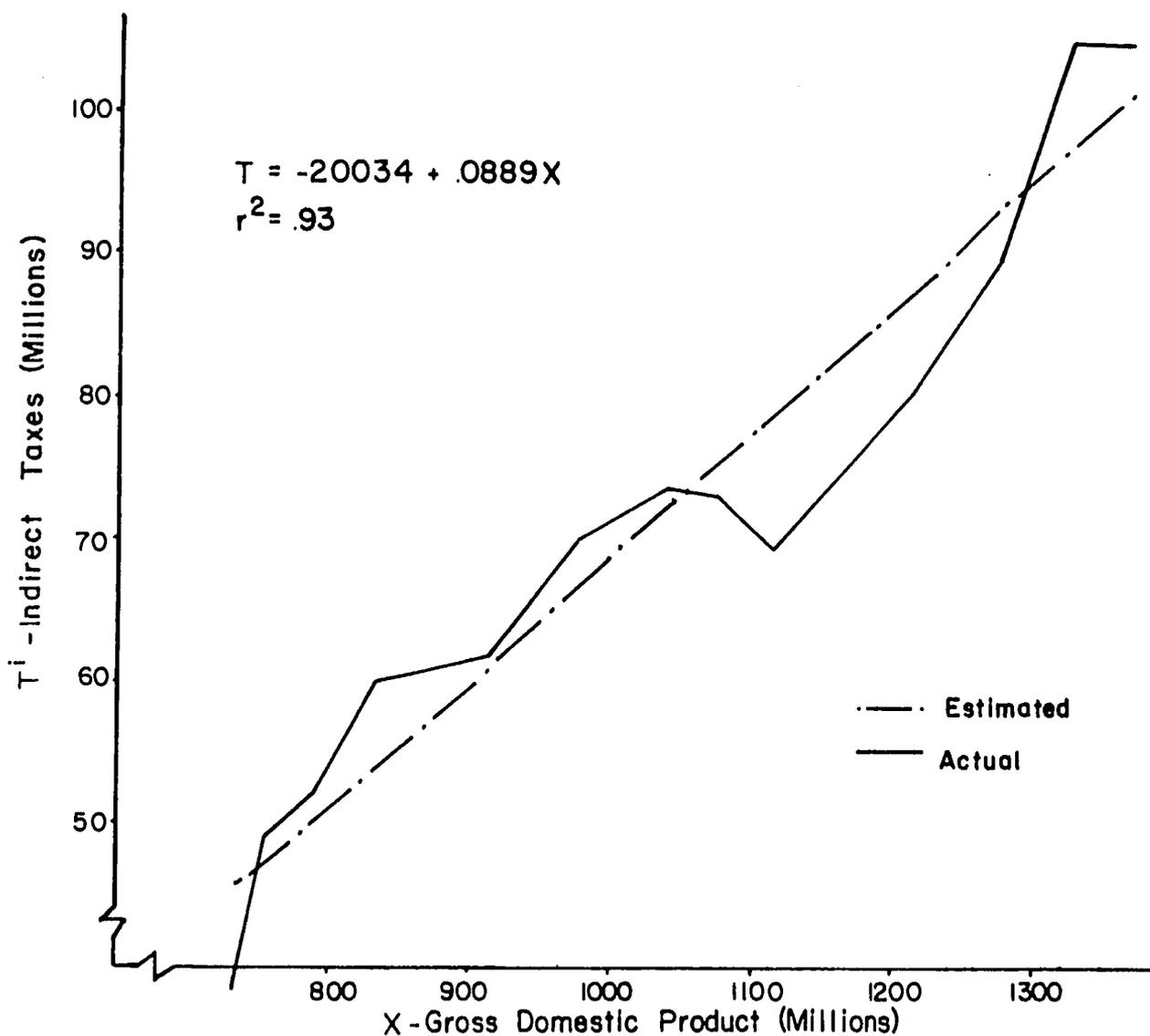


Figure 2.3 Regression-Gross Domestic Product and Indirect Taxes

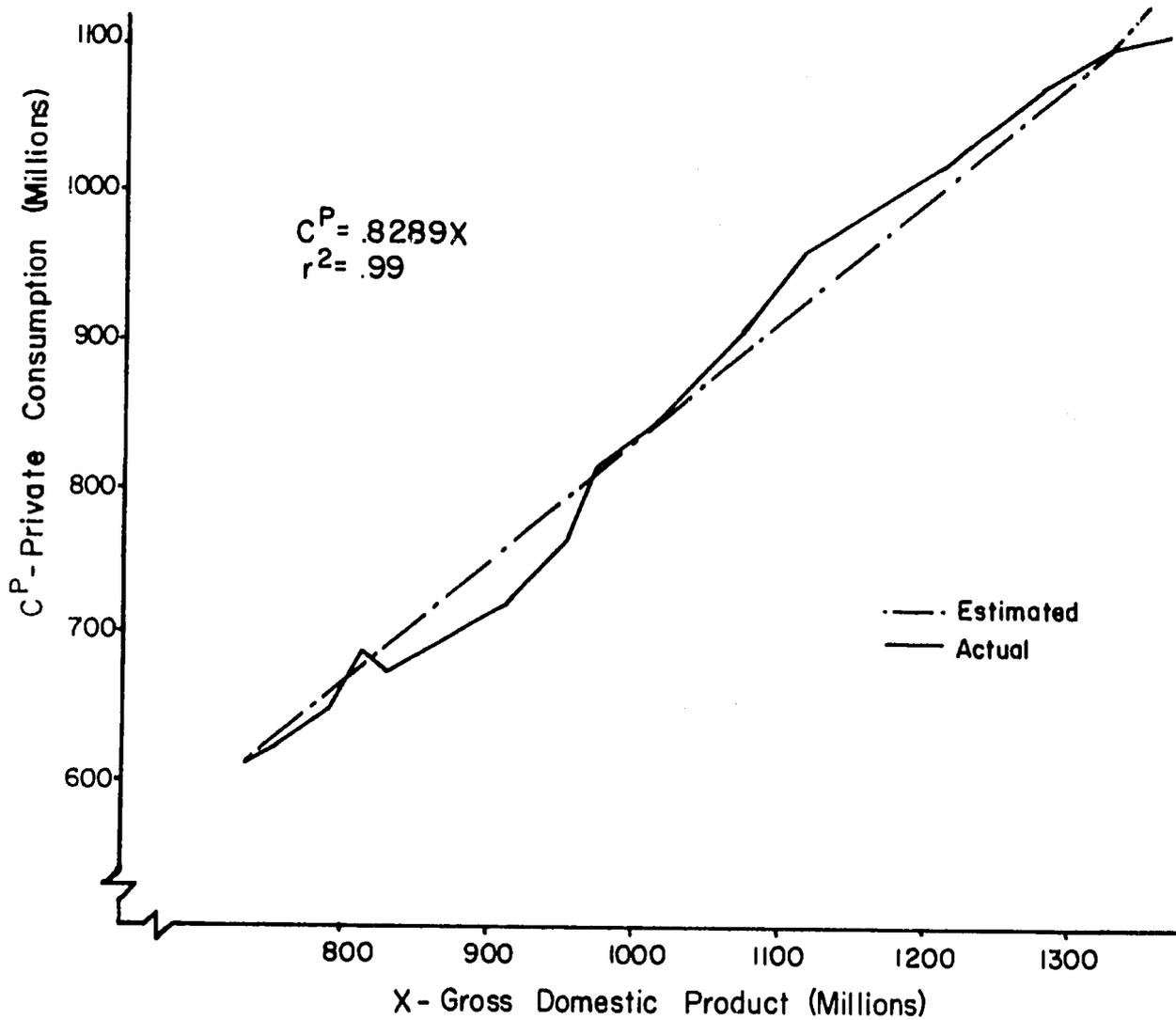


Figure 2.4 Regression - Gross Domestic Product and Private Consumption

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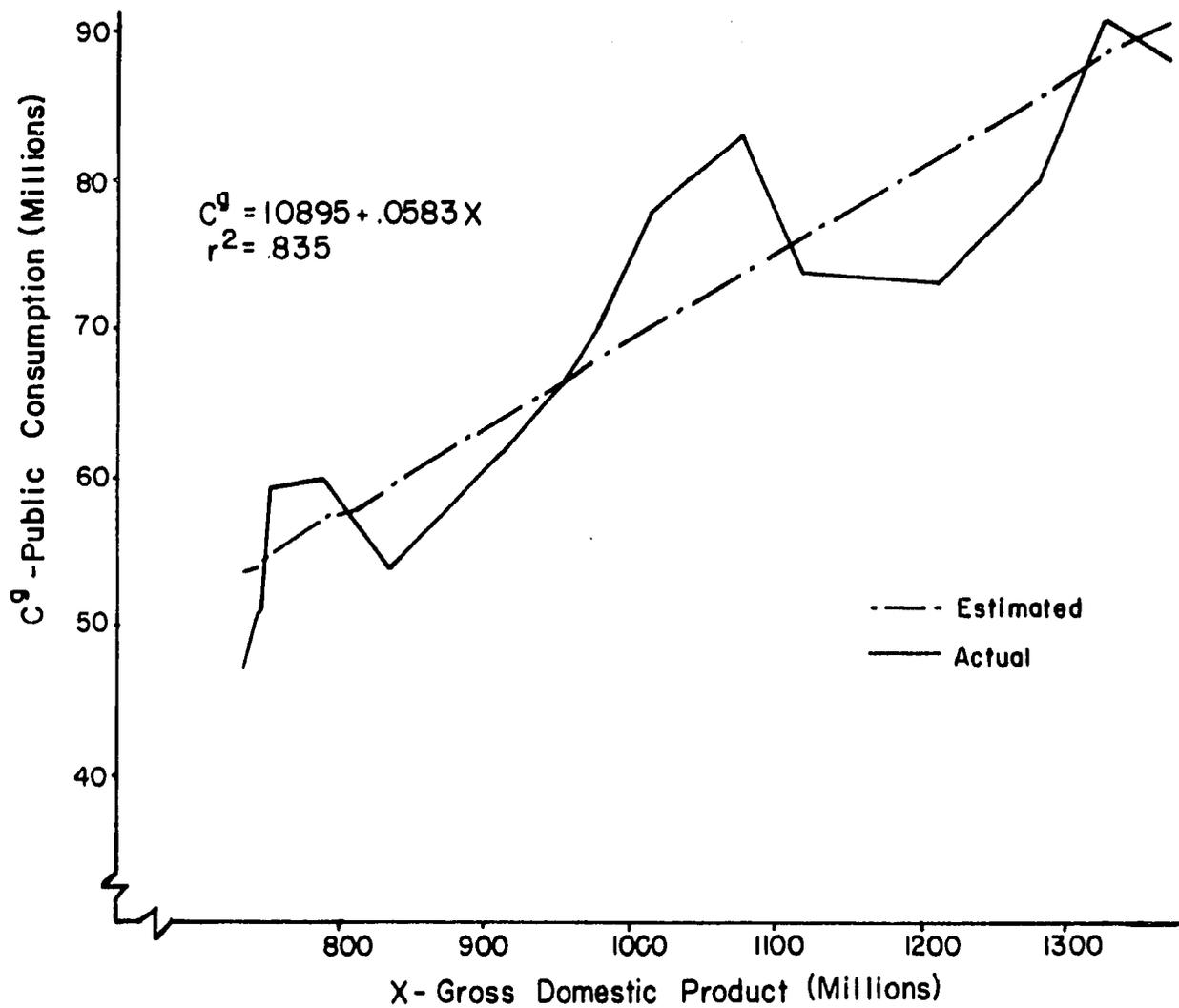


Figure 2.5 Regression- Gross Domestic Product and Public Consumption

(%) on GDP is equal to 3.8. This indicates that a one unit change in E or Z leads to a 3.8 unit change in GDP. The system as specified in the model is moved by changes in the export sector. The reduced form of Model I is given in Appendix 2. a. The predictive ability of the model over the same period (1950-1966) can be tested by plugging in the values of the observed exogenous variables and computing the corresponding values of the endogenous variables. Such a test was undertaken and revealed that the model--as a whole--even though explaining relatively well the major changes in the endogenous variables within the period under consideration, was not capable of coping with very large discrete changes in exogenous variables (e.g. a jump in exports of almost 40 per cent between 1962 and 1963). Likewise, the model could not explain accurately very large shifts in endogenous variables (e.g. the 70 and 50 per cent rise in private and public investment, respectively, between 1955 and 1956. Such changes are abnormal and discontinuous and, as such, cannot be reflected readily by a linear model). It was therefore decided to use the model--as a whole--only to project the growth of GDP. Individual relationships (such as the import and private investment functions) can, however, be used with reasonable confidence to obtain short term projections.

It should be noted that two other variants of Model I were run. Model II is analogous to Model I with the exception of equation 6. a (explaining private investment) which is deleted thus converting private investment into an exogenous variable. Model III is analogous to Model II except that relations 1. a and 3. a are eliminated, thereby converting public transfers and public consumption into exogenous variables.¹

¹The reduced forms of these two models are available upon request.

10.1

2.3. Macroeconomic Projections to 1972

Considering the dependence of GDP on the export sector, the accuracy of GDP projections will be directly related to the quality of projections in the export sector. Table 2-9 was consequently prepared. It starts with the merchandise exports (f. o. b.) projections of the Bank of Guatemala (column 1) at current prices (1968-1972). In order to obtain estimates of exports of goods and services, column 1 was multiplied by 1.15 since the average ratio of exports of goods and services to merchandise exports (f. o. b.), over 1960-1966, amounted to that figure (see column 2).¹ It was assumed that the unit value of exports would remain essentially at its 1966-1968 level (column 3). Thus, column 4 was derived expressing exports of goods and services (E) at constant 1958 prices. Likewise, it was assumed that the unit value of imports would not change compared to its 1966-1968 level (column 5) and therefore that the terms-of-trade would remain fixed over the period 1968-1972 (see column 6). Finally the terms-of-trade effects (Z) were computed in column 8.

It can be seen that the export prospects over the next few years appear bleak. In both 1969 and 1970 the growth rate of exports (E) is predicted to be between 1 and 1.5 per cent a year, while improving to about 4.5 per cent in 1971 and 6 per cent in 1972. This compares very unfavorably with the historical performance reviewed in section 2-1.

¹Table 2-9 gives an alternative set of projections based on the "Informe..." cited in Table 2-10. That alternative (given in parenthesis) is slightly more optimistic than the one selected here.

TABLE 2-9
EXPORTS AND TERMS-OF-TRADE EFFECT PROJECTIONS
(Millions of Quetzales)

Year	(1) Export goods f.o.b. (current price)	(2) Export goods and services (current price)	(3) Export price index $\frac{P_{xt}}{P_{x58}}$ (1958=100)	(4) Exports of goods and services (E) (current prices)
1960	116.2	131.9	86.2	153.0
1961	114.4	128.7	82.2	156.6
1962	118.5	134.8	82.9	162.6
1963	154.1	180.4	86.9	223.0
1964	169.3	195.1	91.0	214.4
1965	187.8	223.5	92.2	242.4
1966	231.9	263.5	88.4	298.1
1967	203.9	234.3	87.0	270.0
1968	238.5 ¹ (221.1) ³	274.3 ² (254.7) ³	87.0	315.0
1969	242.4 (237.4)	278.7 (272.7)	87.0	320.0
1970	245.2 (255.8)	282.0 (292.9)	87.0	324.0
1971	256.6 (266.7)	295.1 (305.7)	87.0	339.0
1972	271.9 (279.8)	312.7 (320.8)	87.0	360.0

¹Banco de Guatemala projections, 1968-1972. See Table 2-10.

²The ratio of exports of goods and services to exports of goods f.o.b. has been 1.15, on the average, in the period 1960-1966. Consequently column (2) was obtained by multiplying column (1) by 1.15.

³Alternative projections contained in source cited in Table 2-11 ("Informe...")

TABLE 2-9--Continued

Year	(5) Import price index $\frac{P_{m58}}{P_{m58}}$ (1958=100)	(6) Terms-of- Trade (1958=100) (3)÷(5)	(7) Purchasing power of Exports (4) x (6)	(8) Terms-of- Trade Effect (Z) (7)-(4)
1960	91.8	93.9	143.7	- 9.3
1961	95.0	86.5	135.5	-21.1
1962	93.2	88.9	144.5	-18.0
1963	94.3	85.8	191.4	-31.7
1964	99.9	91.1	195.3	-19.1
1965	105.4	87.5	212.1	-30.3
1966	106.0	83.4	248.6	-49.5
1967	106.0	82.1	221.7	-48.3
1968	106.0	82.1	258.6	-56.4
1969	106.0	82.1	262.7	-57.3
1970	106.0	82.1	266.0	-58.0
1971	106.0	82.1	278.3	-60.7
1972	106.0	82.1	295.6	-64.4

¹Banco de Guatemala projections, 1968-1972. See Table 2-10.

²The ratio of exports of goods and services to exports of goods f.o.b. has been 1.15, on the average, in the period 1960-1966. Consequently column (2) was obtained by multiplying column (1) by 1.15.

³Alternative projections contained in source cited in Table 2-11 ("Informe...")

(The rate of growth of exports amounted to 7.8 per cent annually over the period 1950-1952 to 1964-1966.) Table 2-10 provides the detailed commodity projections underlying the above figures. It reveals clearly that the value of traditional exports (coffee, cotton, and sugar) is predicted to remain stationary. The total value of these commodities is projected to be lower in 1972 than in 1966. Whatever growth in exports takes place up to 1972 would result mainly from exports to Central America, "other products" and nickel (starting in 1972). Furthermore, the prospects for additional exports to Central America may well be less optimistic than is indicated in the Table, given the present difficulties of CACM. Table 2-10 shows also that the unit prices of the major traditional commodities are not likely to increase, providing support for the assumption that the overall unit value of exports will not go up between 1968 and 1972.

The information on E and Z contained in Table 2-9 (columns 4 and 8) was incorporated into Table 2-11, together with projections of the other exogenous variables appearing in Model I.¹ The import multipliers showing the effect of a one unit change in each exogenous variable on GDP (i. e. X in the model) were taken from the reduced form in Appendix 2-b and applied to the corresponding projected values of the exogenous variables in 1972. The resulting computed level of GDP for 1972 was 1,621 million quetzales at 1958 prices, which is only about 18 per cent above its level in 1966. It would therefore seem that the annual growth rate of GDP between 1966 and 1972 could well be

¹It is clear that the predicted values of some of these variables are nothing more than "guesstimates."

TABLE 2-10
EXPORT PROJECTIONS TO 1972¹

Year	1963	1964	1965	1966	
Coffee	Volume	98,242.2	76,051.8	95,279.8	109,231.6
	Price	784.8	934.8	963.0	915.2
	Value	77,075.4	71,088.6	91,691.3	100,067.0
Cotton	Volume	50,420.6	64,078.0	70,591.6	92,800.4
	Price	491.3	500.0	487.0	480.4
	Value	24,291.8	32,064.8	34,447.2	44,535.1
Banana ²	Volume	5,622.8	4,139.3	1,510.3	3,133.9
	Price	2.0	2.9	3.3	3.3
	Value	11,497.3	11,845.2	4,972.5	10,455.1
Sugar	Volume	46,676.2	54,864.2	31,588.2	52,269.8
	Price	130.4	154.3	132.6	115.2
	Value	6,118.3	8,489.6	4,171.8	5,977.6
Meat	Volume	6,044.4	4,765.6	5,809.8	5,924.8
	Price	734.8	776.1	784.8	902.2
	Value	4,436.4	3,695.6	4,559.5	5,346.9
Nickel	Volume				
	Price	---	---	---	---
	Value				
Central America					
Total Value	17,294.4	29,558.2	35,574.2	50,825.3	
Other Products					
Value	13,419.1	12,582.7	13,043.5	14,720.6	
Total Value	154,132.7	169,324.7	188,460.0	231,926.7	

¹Volume in metric tons, value in thousands of quetzales, price in quetzal per metric ton. Value figures are in current quetzales.

²Volume in racimos (bunches).

Source: Banco de Guatemala

TABLE 2-10--Continued

1967	1968	1969	1970	1971	1972
81,295.8	98,352.6	92,000.0	92,000.0	98,900.0	111,285.0
841.3	813.4	869.6	847.8	852.2	843.5
68,360.8	80,000.0	80,000.0	78,000.0	84,300.0	87,300.0
67,054.2	83,844.2	83,637.2	83,637.2	83,637.2	83,637.2
469.6	479.0	479.0	479.0	479.0	479.0
31,492.9	40,100.0	40,000.0	40,000.0	40,000.0	40,000.0
2,645.3	4,117.6	4,176.5	4,235.3	4,294.1	4,352.9
3.5	3.4	3.4	3.4	3.4	
9,230.6	14,000.0	14,200.0	14,400.0	14,600.0	14,800.0
60,917.8	45,731.7	45,731.7	45,731.7	46,493.9	46,493.9
145.7	131.2	131.2	131.2	131.2	131.2
8,872.1	6,600.0	6,000.0	6,000.0	6,100.0	6,100.0
8,781.4	9,369.6	9,369.6	9,369.6	9,369.6	9,369.6
906.5	864.5	864.5	864.5	864.5	864.5
7,967.0	8,100.0	8,100.0	8,100.0	8,100.0	8,100.0
---	---	---	---	---	---
57,843.3	67,000.0	70,300.0	73,800.0	77,400.0	81,200.0
20,146.4	22,700.0	23,800.0	24,900.0	26,100.0	27,400.0
203,913.1	238,500.0	242,400.0	245,200.0	256,600.0	271,900.0

¹Volume in metric tons, value in thousands of quetzales, price in quetzal per metric ton. Value figures are in current quetzales.

²Volume in racimos (bunches).

Source: Banco de Guatemala

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TABLE 2-11

MODEL I, VALUES OF EXOGENOUS VARIABLES, 1963-1972,
USED FOR PROJECTION PURPOSES
(constant 1958 prices, millions of quetzales)

Year	\bar{F}	\bar{E}	\bar{Z}	\bar{E}_{-1}	\bar{Z}_{-1}	\bar{T}^d	\bar{T}^o	\bar{I}_f^g	$\bar{\Delta} S$
1963	25.7	223.0	-31.7	162.6	-18.0	19.5	10.8	35.3	8.6
1964	43.5	214.4	-19.1	223.0	-31.7	21.5	9.8	45.6	7.3
1965	13.9 ¹	242.4	-30.3	214.4	-19.1	25.6	15.5	25.6 ¹	8.2
1966	1.0 ¹	298.1	-49.5	242.4	-30.3	28.1	11.8	8.2 ¹	1.5
1967	35.0	270.0	-48.3	298.1	-49.5	28.8	14.0	17.0	-
1968	37.0 ⁴	315.0 ²	-56.4 ³	270.0	-48.3	29.6 ⁴	14.0 ⁴	18.0 ⁴	-
1969	37.0	320.0	-57.3	315.0 ²	-56.4 ³	32.2	14.0	21.0	0
1970	45.0	324.0	-58.0	320.0	-57.3	33.1	14.0	25.0	0
1971	46.0	339.0	-60.7	324.0	-58.0	34.1	14.0	26.0	0
1972	47.0	360.0	-64.6	339.0	-60.7	35.1	14.0	27.0	0

¹Estimates. It is likely that both \bar{F} and \bar{I}_f^g were considerably larger than indicated. Since they cancel one another out, an underestimation of both variables does not matter.

²Derived from Table 2-9. Export projections are based on the Banco de Guatemala projections. Current values were converted to constant 1958 prices on the assumption that the unit value of exports would remain at about its 1966-1968 level. For details see Table 2-9.

³Terms-of-trade effects are projected on the assumption that the terms-of-trade would be maintained at the 1966-1968 level.

⁴Projections based on Gobierno de la Republica de Guatemala, Consejo Nacional de Planificacion, Informe de la Situacion Economica de Guatemala y de sus Perspectivas hasta 1972. Aug. 1968. Data were converted to 1958 prices.

around, or even below, 3 per cent. The above forecast is, of course, conditional on the exogenous variables assuming the predicted values given in Table 2-11 and on no structural changes occurring in the economy before 1972. A better than anticipated export performance or improvement in the terms-of-trade would have a substantial positive impact on GDP since the multiplier value is over 3.8. Likewise, structural changes such as increased import substitution which would have the effect of reducing the parameters of the import function in Model I, or a jump in the investment ratio could lead to a higher growth rate of GDP. It is possible that an acceleration in import substitution in consumer goods and other goods (i. e. chemical and pharmaceutical products) between now and 1972 and an increase in the investment ratio could push the growth rate of GDP to perhaps 4 per cent annually over the period under consideration. This last figure, incidentally, is the one which the Consejo Nacional de Planificaci6n is predicting for 1968-1972. On the basis of the above analysis it should be considered as a ceiling unlikely to be reached.

In conclusion, the short run (1968-1972) prospects of the Guatemalan economy do not appear bright. The implications of a 3-4 per cent growth rate of GDP for some of the other policy objectives such as employment creation and improving income distribution could be serious. The Direcci6n General de Estadística projected total population and economically active labor force, respectively to 1972. The ratio of the latter to the former falls from 30.7 per cent in 1964 to 28.9 per cent in 1972. A low growth rate of GDP could lead to an even further reduction in the capacity of the economy to absorb workers productively. Furthermore, the unfavorable export prospects will constrain the capacity-to-import and thereby limit the supply of investment goods needed for growth.

APPENDIX 2. a

LIST OF REGRESSIONS

A number of regressions were run using annual data over the period 1950-1966. All variables are expressed in constant prices (1958 quetzales).

The estimated equations were obtained following the ordinary least squares procedure. The results obtained are presented below with

a) the standard error of the coefficients in parenthesis below each coefficient

and

b) the values of the coefficient of determination (r^2), the Durbin-Watson test for serial correlation among residuals and the t ratios, respectively, on the right hand side of each equation.

All variables are defined at the end of the appendix.

TAX FUNCTIONS

$T^T = -2853 + .0108 X$ (1244) (.0012)	$t_0 = -2.3$ $r^2 = .838$	$t_1 = 8.2$ D. W. = 1.12
$T^R = -2646.4 + .0118 C$ (1214.6) (.0013)	$t_0 = -2.2$ $r^2 = .840$	$t_1 = 8.2$ D. W. = 1.10
$T^R = -2396 + .0125 CP$ (1258) (.0015)	$t_0 = -1.9$ $r^2 = .823$	$t_1 = 8.4$ D. W. = 1.10
$T^i = -20034 + .0889 X$ (6179) (.0061)	$t_0 = -3.2$ $r^2 = .934$	$t_1 = 14.6$ D. W. = .82

$$T^i = -554 + .0470 C^P + .1924 M$$

(939) (.0259) (.0866)

$$t_0 = .06 \quad t_1 = 1.8 \quad t_2 = 2.2$$

$$r^2 = .926 \quad D.W. = .85$$

$$T^i = .0695 X$$

(.0015)

$$t_1 = 45.7$$

$$r^2 = .888 \quad D.W. = .51$$

$$T^i = .0457 C^P + .1957 M$$

(.0115) (.0585)

$$t_1 = 4.0 \quad t_2 = 3.3$$

$$r^2 = .926 \quad D.W. = .85$$

$$T^d = 1218 + .0186 X + 555.4 Du_i$$

(4417) (.0046) (2868.4)

$$t_0 = .28 \quad t_1 = 4.1 \quad t = .19$$

$$r^2 = .677 \quad D.W. = .41$$

$$T^d = 1302 + .0185 X - 17613.0 Du_i + .67997 Du_i$$

(4562) (.0047) (46292.1) (1.7239)

$$t_0 = .29 \quad t_1 = -3.9$$

$$t_2 = .38 \quad t_3 = .39$$

$$r^2 = .680 \quad D.W. = .43$$

$$T^d = 1285.0 + .0186 X + .02341 Du_s$$

(4420.4) (.0046)

$$t_0 = .29 \quad t_1 = 4.0 \quad t = .22$$

$$r^2 = .677 \quad D.W. = .40$$

$$T^d = .0199 X$$

(.0007)

$$t_1 = 30.1$$

$$r^2 = .675 \quad D.W. = .43$$

$$T^d = 15830 + .0186 X$$

(.0035)

$$t_0 = .44 \quad t_1 = 5.3$$

$$r^2 = .652 \quad D.W. = .35$$

(T^d above is based on an early series computed by me which differs slightly from the later T^d series obtained.)

$$T^o = 13603 + .00036 X$$

(3366) (.00331)

$$t_0 = 4.0 \quad t_1 = .11$$

$$r^2 = .00079 \quad D.W. = .85$$

CONSUMPTION FUNCTIONS

$$C^g = 10895 + .0583 X$$

(6798) (.0067)

$$t_0 = 1.6 \quad t = 8.7$$

$$r^2 = .835 \quad D.W. = .94$$

$$C^g = .0688 X$$

(.0014)

$$t_1 = 49.2$$

$$r^2 = .807 \quad D.W. = .82$$

$$C^P = -24820 + .8528 X$$

21833) (.0215)

$$t_0 = -1.1 \quad t_1 = 39.7$$

$$r^2 = .990 \quad D.W. = .84$$

$$C^P = -24507 + .8698 X^d$$

(20723) (.0067)

$$t_0 = 1.2 \quad t_1 = 41.8$$

$$r^2 = .992 \quad D.W. = .92$$

$$CP = .8289 X \\ (.0043)$$

$$t_1 = 192.8 \\ r^2 = .990 \quad D.W. = .74$$

INVESTMENT FUNCTIONS

$$IP = -26249 + .7960 E_{-1} + .8749 Z_{-1} \quad t_0 = -1.3 \quad t_1 = 5.7 \quad t_2 = 2.5 \\ (19903) (.1408) \quad (.3517) \quad r^2 = .829 \quad D.W. = 1.33$$

$$IP = 17564 + .4843 E_{-1} \quad t_0 = 1.6 \quad t = 6.4 \\ (10918) (.0752) \quad r^2 = .748 \quad D.W. = .85$$

$$IP = .6160 E_{-1} + .4847 Z_{-1} \quad t_1 = 26.5 \quad t_2 = 2.9 \\ (.0233) \quad (.1655) \quad r^2 = .815 \quad D.W. = .98$$

$$IP = .5977 E_{-1} \quad t_1 = 21.7 \\ (.0275) \quad M^2 = .701 \quad D.W. = .82$$

IMPORT FUNCTIONS

$$M = -77373 + .1770 C + .6360 I \quad t_0 = -6.7 \quad t_1 = 9.3 \quad t_2 = 6.0 \\ (11089) (.0191) \quad (.1057) \quad r^2 = .974 \quad D.W. = 1.46$$

$$M^C = A_C + .0518 C \quad r^2 = .677 \quad D.W. = 1.06 \\ (.0096)$$

$$M^i = A_i + .5004 I \quad r^2 = .925 \quad D.W. = .87 \\ (.0380)$$

LIST OF VARIABLES

T^T Transfers	IP Private Gross Investment
T^i Indirect Taxes	I^G Public Investment
T^d Direct Taxes	I^F Financial Investment and Amortization of Public Debt
Y^N Net Non Tax Public Income	I Total Gross Investment
CP Private Consumption	M Imports of Goods and Services
C^G Public Consumption	M^C Imports of Consumer Goods
C Total Consumption	M^i Imports of Investment Goods
X Gross Domestic Product	S^G Public Savings
X^d Disposable Product	

- F Internal and External Public Loans
- E Exports of Goods and Services
- E_{-1} Exports of Goods and Services
- Z Terms Lagged of one year Trade Effects
- Z_{-1} Terms Lagged of one year Trade Effects
- ΔS Changes in Stocks
- Du_i Dummy Variable for Intercept (to account for new personal income tax; 1965 and 1966)
- Du_i Dummy Variable for Slope (to account for new personal income tax; 1965 and 1966)

APPENDIX 2. b
REDUCED FORM GUATEMALA, MODEL I

Endogenous Variables	Exogenous Variables									
	\bar{E}_{-1}	\bar{Z}_{-1}	\bar{T}^d	T^o	\bar{F}	\bar{I}_f^g	ΔS	E	Z	Constant
T^r	0.0119	0.0131	0.0150	0.0150	0.1050	-0.1050	0.0411	0.0411	0.0411	-263.68
T^i	0.0981	0.1078	0.1232	0.1232	0.1232	-0.1232	0.3385	0.3385	0.3385	1279.91
C^g	0.0643	0.0707	0.0808	0.0808	0.0808	-0.0808	0.2220	0.2220	0.2220	24872.50
C^p	0.9145	1.0051	1.1489	1.1489	1.1489	-1.1489	3.1562	3.1562	3.1562	198730.00
M	0.6934	0.7621	0.8711	0.8711	0.8711	-0.8711	0.6459	0.6459	0.6459	-65726.88
I^p	0.7960	0.8749	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	-26249.00
S^g	0.0218	0.0240	1.0274	1.0274	1.0274	-1.0274	0.0754	0.0754	0.0754	-23328.91
I^g	0.0218	0.0240	1.0274	1.0274	1.0274	-1.0274	0.0754	0.0754	0.0754	-23328.91
C	0.9788	1.0758	1.2297	1.2297	1.2297	-1.2297	3.3782	3.3782	3.3782	223602.44
I	0.8178	0.8989	1.0274	1.0274	1.0274	-1.0274	0.0754	0.0754	0.0754	-49577.89
X	1.1033	1.2126	1.3860	1.3860	1.3860	-1.3860	3.8077	3.8077	0.8077	239751.44

Source: Derived from Model I in section 2.3.

CHAPTER 3

THE ROLE OF AGRICULTURE IN THE ECONOMY

3.1. Overall Production Trends

The share of agriculture in total output declined slightly between 1950 and 1966 from 32.5 to 30.1 per cent. The bulk of the reduction occurred before 1958 (see Table 3-1). Since then the relative share of agriculture has remained quite stable. The labor force in agriculture increased from about 660,000 to 860,000 over the period under consideration. As one would expect the ratio of agriculture to total labor force fell somewhat from 68.2 per cent in 1950 to 65.4 per cent in 1964.

Within agriculture the major changes appear to be the increasing relative importance of export crops, which grew from 32.4 per cent in 1950 to 37.4 per cent of gross agricultural output in 1966. (See Table 3-1). Coffee and cotton account for this trend. The share of meat and livestock production, on the other hand, fell from 25.5 to 22.0 per cent. The increasing use of intermediate and capital inputs (e.g., fertilizer, insecticides) is reflected by the fact that inputs amounted to 9.2 per cent of gross agricultural output in 1966 as compared to only 3.7 per cent in 1950.

Table 3-2 shows that gross agricultural output grew at 4.0 per cent annually over the period under consideration compared to 3.6 per cent for agricultural value added. The above difference is explained by the greater

TABLE 3-1

AGRICULTURE: RELATIVE SHARE IN GROSS DOMESTIC PRODUCT
AND ECONOMICALLY ACTIVE POPULATION (IN PERCENTAGES) AND
DISTRIBUTION OF PRODUCTION WITHIN AGRICULTURE

Agriculture	Percentages		
	1950	1958	1966
Ratio of Agricultural Output To GDP at 1958 Prices	32.5	29.3	30.1
Labor Force Employed in Agriculture	68.2		65.4 ¹
Total Agricultural Production	100.0	100.0	100.0
1.1. Agricultural Crops	65.0	64.2	68.9
1.1.1. Export Crops	32.4	32.5	37.4
1.1.2. Domestic Consumption Crops	25.5	24.8	24.6
1.1.2.a. Basic Crops	13.3	12.2	13.1
1.1.2.b. Other Products	12.2	12.6	11.5
1.1.3. Intermediate Products	7.0	7.0	6.9
1.2. Meat and Livestock Production	25.5	25.8	22.0
1.3. Forest Products	8.6	9.0	8.2
1.4. Fish	.9	1.0	1.0
1.5. Inputs	3.7	6.9	9.2
1-1.5. Value Added in Sector	96.3	93.1	90.8

Source: Banco de Guatemala, Cuentas Nacionales de Guatemala, 1968
and D. G. E. - Censos de la Población.

¹For 1964.

TABLE 3-2
 CUMULATIVE GROWTH RATES OF AGRICULTURAL
 OUTPUT AT 1958 PRICES
 (Percentages)

	1950-1952 to 1957-1959	1957-1959 to 1964-1966	1950-1952 to 1964-1966
Gross Agricultural Output	3.0	5.0	4.0
1-1.5. Value Added in Agriculture	2.7	4.6	3.6
1.1.1. Export Crops	4.1	6.6	5.3
1.1.2. a. Basic Domestic Crops for Consumption	.9	6.6	3.6
1.5. Inputs into Agriculture	8.9	9.8	9.3

Source: Banco de Guatemala, Cuentas Nacionales, 1968.

relative use of inputs over time. The same table also illustrates well the fact that an acceleration of agricultural output took place since 1958 and that agricultural exports have been the dynamic force in that sector. It is well known that an increase in the use of intermediate purchased inputs is a "sine qua non" of agricultural development. In this respect it is important to note the reasonably high growth rate of inputs used in agriculture. At the same time it has to be recognized that the great bulk of these inputs went into production for exports. It is estimated that approximately one-half of the chemical fertilizer used is applied to coffee and one-fourth to cotton, leaving only one-fourth for all other

export and domestic crops. Of the crops for domestic consumption only wheat is a significant user of fertilizer. Thus, the potential scope for increased use of inputs in the traditional sector and in the commercialized sector producing for domestic consumption is still quite large.

The relative importance of export crops within the agricultural crops group (category 1.1 in Table 3-1) has remained fairly stable within the period under consideration. Export crops increased their relative share of total agricultural crops from 47.8 to 53.5 per cent over the period 1950-1952 to 1964-1966. This tendency was caused by the tremendous increase in the share of cotton from about half a per cent in 1950-1952 to 13.7 per cent of total agricultural crops in 1964-1966, while the coffee and bananas shares declined. The shares of domestic consumption and industrial crops declined somewhat over the period under consideration. Table 3-3 indicates the production figures by major crops. It reveals clearly the previously described production trends and particularly the sharp acceleration of output in the second subperiod (1957-1959 to 1964-1966) compared to the first one (1950-1952 to 1957-1959). It has already been seen that cotton is largely responsible for the jump in the growth rate of agricultural export crops. It is less easy--at first sight--to provide a good explanation for the rate of growth of output of basic domestic crops for consumption jumping from .9 in the first subperiod to 6.5 per cent in the second one. A look at the annual data confirms the fact that it is not due to unusual weather conditions in any of the benchmark periods. Annual corn output data by departments reveal that the sudden jump in national production was caused almost entirely by the additional land base used for corn in two coastal

TABLE 3-3

AGRICULTURAL CROPS: PRODUCTION BY MAJOR CROPS AT 1958 PRICES (IN THOUSANDS OF QUETZALES) AND ANNUAL CUMULATIVE GROWTH RATES, 1950-1952 TO 1964-1966

Agricultural Crops	1950-1952	1957-1959	1964-1966	1950-1952	1957-1959	1950-1952
	Ave.	Ave.	Ave.	to 1957-1959 Growth	to 1964-1966 Growth	to 1964-1966 Growth
1.1.1 Export Crops	77281.1	102415.6	159878.1	4.1	6.6	5.3
Coffee	58530.3	77263.0	102663.7	4.1	4.2	4.1
Cotton	831.2	7489.6	40827.5	37.0	26.0	32.0
Bananas	16488.3	15040.4	9672.5	-1.4	-3.0	NA
Cotton Seed	81.8	794.1	4455.7	38.4	28.0	33.0
"Others"	1349.0	1561.9	2258.7	2.1	5.4	3.7
1.1.2 Domestic Consumption Crops	66324.2	76389.2	108892.9	2.0	5.2	3.6
1.1.2.a Basic Crops	35272.7	37429.6	58256.9	.9	6.5	3.6
Corn	22104.2	22617.6	34838.5	.2	6.4	3.3
Beans	12284.2	13551.6	21491.0	1.4	6.8	4.1
Potatoes	878.3	1260.3	1927.4	5.3	6.3	5.8
1.1.2.b "Other Products"	31057.6	38959.6	50636.0	3.3	3.8	3.6
Fruits	11632.7	14675.2	18423.4	3.4	3.3	3.4
Vegetables	10869.4	13817.8	16931.4	3.5	2.9	3.2
Misc.	8435.5	10466.6	15281.2	3.1	5.5	4.4
1.1.3 Products for Industrial Consumption	17907.4	21926.3	30156.2	2.9	4.6	3.8
Sugar Cane	9715.9	14609.8	17433.6	6.0	2.6	4.3
Wheat (unprocessed)	2873.1	2506.0	4723.0	-2.0	9.5	3.6
Rice (unprocessed)	1075.0	1353.4	3009.6	3.4	15.8	7.6
Tobacco	844.2	774.7	1628.0	-1.3	11.2	4.8
Rubber	137.1	242.7	1040.3	8.5	23.0	15.6
"Others"	3262.0	2439.8	2321.7	-4.0	.5	NA
1.1 Total Agricultural Crops	161512.8	200731.0	298927.1	3.2	5.9	4.5

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Source: Banco de Guatemala, Cuentas Nacionales, 1968.

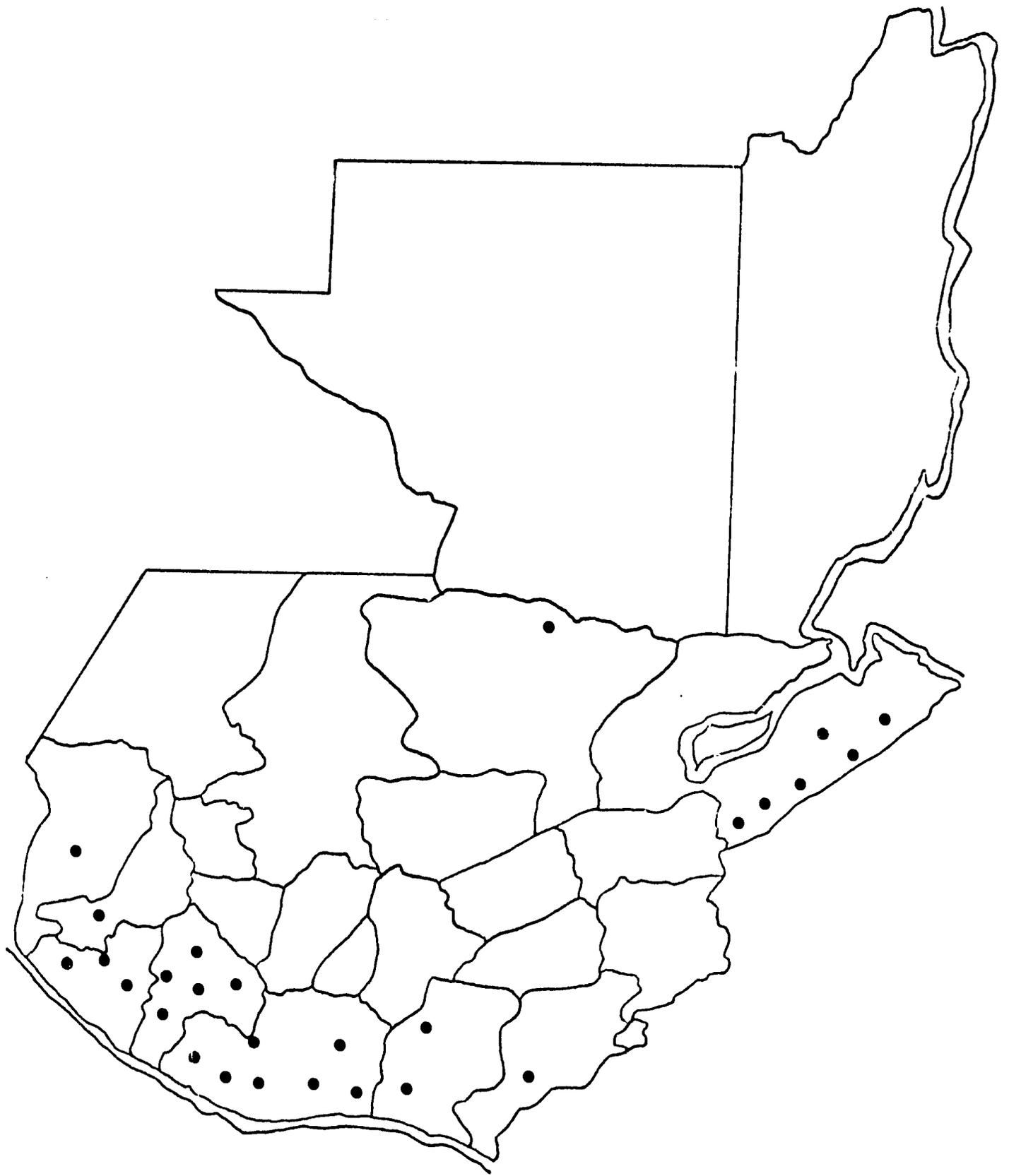


Figure 4.1 Location of Agrarian Development Zones administered by INTA (1967)

TABLE 4-2
ZONES OF AGRARIAN DEVELOPMENT (INTA)

Parcelamiento	Number of Parcels	Modal Size of Parcel (Has.)	Total Area in Parcels	Total Area of Zone (Has.)	Total No. of Inhabitants in the Zone ²
El Cajón	112	20	2230.65	2643.94	700
Cuyuta	269	15	4600.29	6287.62	5664
Nueva Concepción	1119	20	25191.40	34909.28	40672
El Arisco	154	7	1080.59	1677.74	1009
Los Angeles	108	20	2127.01	2325.50	764
Santa Isabel	90	13	1256.55	1353.77	707
Arizona	117	5	597.88	684.89	1420
El Reposo	145	20	2819.63	3422.07	1054
La Máquina	1212	20	27162.49	34479.00	26784
Monterrey	174	20	3011.20	4175.02	5494
El Japón Nacional	81	10	804.09	1525.95	581
Guatalón	39	18	741.01	1075.20	234
Santa Elena	30	20	600.39	671.16	864
Caballo Blanco	117	20	2296.36	3118.56	952
El Rosario	97	20	1988.56	2594.72	2610
Santa Fe	55	20	1055.49	1284.45	372
La Blanca	141	20	2071.24	9823.19	2148
Sebol	612	45	---	25885.41	3300
Santo Tomás de Castilla	114	10	2594.73	4828.45	956
Navajoa	189	87	5833.39	10694.78	1472
Virginia	189	20	3615.87	6258.80	1901
El Encantador y Anleu	15	90	1323.55	1347.38	245
San Joaquín	30	15	452.28	1939.37	566
Santa Ines	14	206	2804.22	14096.61	780
Montufar	246	20	3931.30	10558.27	10418
Las Cabezas	110	10	---	1738.41	495
Totals	5579		100,190.17	189,399.54	112,162

Source: INTA, June, 1967

¹No indication of area settled; not included in total.

²Estimated, based on surveys in the Parcelamientos.

Note: List does not include El Cacahuito, Department of Santa Rosa. There is little information concerning this parcelamiento except that INTA reports some 203 people having received land as of 1967.

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4.2.2 National Farms

Another important element of the structure of the agriculture sector is the group of farms owned by the government and operated by INTA, "fincas nacionales." These farms were expropriated from German Nationals during World War II and 24 have remained in the hands of the government (Figure 4-2). Some of these farms are potentially among the most productive in the country but their management over the years has been criticized for inefficiency. Coffee and sugar are the major products of the farms. The avowed policy of INTA is to turn these farms back to private ownership by organizing them into cooperatives owned by their farmer-members. Progress in realizing this goal, however, has been slow. In total these farms involve about 17,000 hectares of cultivable land and provide jobs for some 4300 workers (Table 4-3).

The most important conclusions and implications of these data can now be reviewed and emphasized. Guatemala is a classic example of inequality in farm size distribution. Almost 90 per cent of all farms had less than 7 hectares included in the farm unit in 1964. The average size of farm for this large group was only about 2 hectares. Less than 20 per cent of the total land in farms in the country was controlled by these 365,000 farmers. At the other end of the size scale, some 9000 large farms--representing only 3 per cent of the total number of farms--controlled more than 60 per cent of the area in farms. Between these extremes was a group of about 45,000 moderately-sized "family" farms. This group represented 10 per cent of the farms and controlled about 20 per cent of the land in farms.

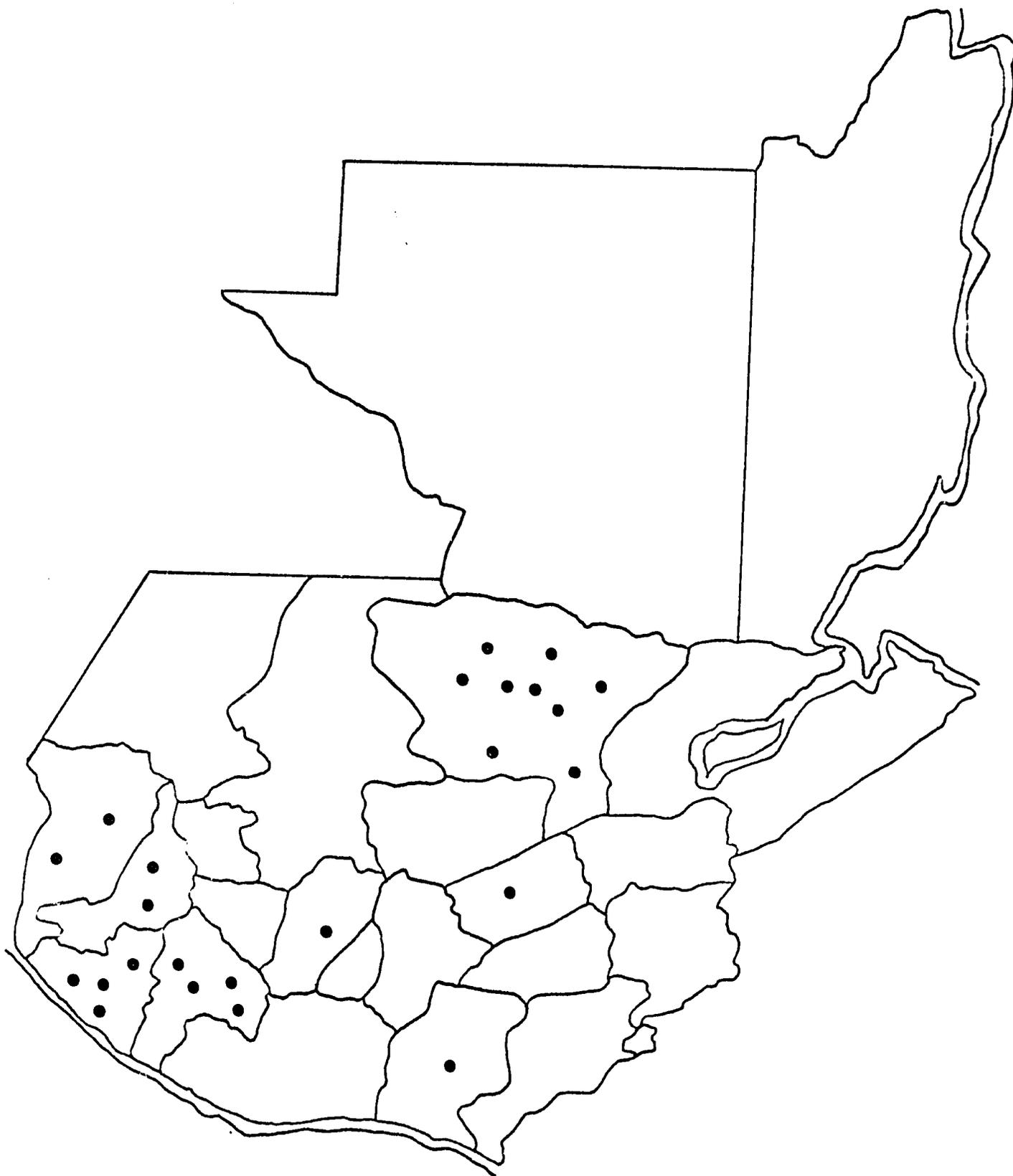


Figure 4.2 Location of National Farms (INTA)

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TABLE 4-3
NATIONAL FARMS OF GUATEMALA - AUGUST, 1966

Name and Location of Farm	Area		Coffee	Coffee Production (Kgs.)	Number of Workers
	Total	Cultivable			
1. Chuchuapa No. 4 Sta. Rosa	51	51	13	3,312	38
2. Chimax y Anexo No. 55 A. Verapaz	1402	286	7	3,266	302
3. Campur No. 53 A. Verapaz	21343	2700	443	159,712	528
4. Morelia Sta. Sofia No. 14 Chimalt.	1230	924	571	338,882	315
5. Chicolá No. 22 Suchitepequez	2483	2294	1616	1,050,502	902
6. Las Camelias Xolhuitz No. 31 Retal.	244	213	129	96,186	64
7. Candelaria Xolhuitz No. 32 Retal.	2504	746	561	529,276	378
8. Eden Xolhuitz No. 33 Retal.	125	105	105	96,002	65
9. Las Mercedes No. 39 Quezaltenango	681	681	471	440,910	512
10. Pensamiento Palmira No. 40 Quezaltenango	632	613	554	309,856	266
11. La Montafia No. 50 San Marcos	62	62	44	31,924	33
12. La Isla, Anexo Chimax A. Verapaz	269	201	0	0	
13. Chipip, Anexo Chimax A. Verapaz	225	186	42	11,270	
14. La Providencia Chimax A. Verapaz	3010	773	10	4,922	
15. Saxoc No. 60 Chimax A. Verapaz	865	860	78	30,452	101
16. San Vicente No. 61 Chimax A. Verapaz	4512	1977	186	50,140	161
17. Sacsuhá No. 68 Chimax A. Verapaz	4117	3088	0	0	367
18. El Carmen Tajumulco No. 85 Sn. Marcos	398	224	49	19,274	81
19. La Fortuna Anez. Chicolá Such.	7	7	7	6,900	
20. El Carmen Villa Seca No. 114 Retal.	323	320	108	51,244	102
21. Chirrepec No. 134 Alta Verapaz	325	315	0	0	69
22. Candelaria Pacan No. 135 Such.	45	39	13	3,634	11
23. La Montafita No. 146 El Progreso	382	367	87	77,464	22
24. El Engano Anexo Fca. Chicolá. Such.	5	5	5	2,208	1
Total	45,240	17,037	5097	3,317,336	4318

Source: Office of National Farms (INTA)

Population pressure is resulting in further subdivision of farms and formation of additional "minifundio." Thus, there is a continuous increase in the number and decrease in the size of small subsistence farmers. As a result, problems of underemployment, cultivation of marginal land, lack of crop rotation, poor technology and low productivity of land and labor are becoming more serious.

There is a further important implication of the size distribution for programs designed to accelerate agricultural development. Responses to alternative programs and policies can be expected to be different depending on the type of producer. The large number of small farmers have different needs, resources and limitations, and should not be expected to respond to the same policies and programs as would elicit responses from the large farmers. Similarly the smaller number of decision makers and the considerable difference in economic status and resources of the large farmers could make some programs successful for them but largely ineffective as far as reaching producers in the subsistence sector. Policies and programs must be tailored to the actual conditions of the farmers to be reached and must take full cognizance of the realities of their number, size and economic status.

4.3 Farm Tenancy and Management Patterns

While the Guatemalan agricultural sector is characterized by small "minifundios" it is also true that most farms are owned by the farmers (Table 4-4A). This pattern is most pronounced for the large farms where 90 per cent were owned and almost none were rented in 1964. The proportion of ownership in the middle size class was 80 per

TABLE 4-4A
GUATEMALA: FARM TENANCY PATTERNS

Farm Size Class	Number of Farms	Owners ¹		Renters		Collective Ownership		Colonos		Other	
		Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms
Less than 0.70 hectares	85,083	51,011	60.0	11,531	13.5	4,169	4.9	14,747	17.3	3,625	4.3
From 0.70 to 6.99 hectares	279,797	176,538	63.1	34,683	12.4	14,877	5.3	31,665	11.3	22,034	7.9
From 6.99 to 45.13 hectares	43,656	35,712	81.8	657	1.5	1,495	3.4	2,190	5.0	3,602	8.3
From 45.13 to 902.51 hectares	8,420	7,611	90.4	145	1.7	51	0.6	2	0.0	611	7.3
More than 902.51 hectares	388	347	89.4	10	2.6	1	0.3	--	--	30	7.7
Guatemala	417,344	271,219	65.0	47,026	11.3	20,593	0.9	48,604	11.6	29,902	7.2

Source: Second Agricultural Census, 1964. Census Bureau, Guatemala.

¹Includes farm units where some land is owned and the remainder is held under a different type of tenancy.

cent but again few farms were rented. The proportion of owned farms fell to about 60 per cent for the two small farm classes. The other important types of tenancy found among small farmers were renters (13 per cent) and colonos (15 per cent).

Colonos are resident laborers on large farms who receive small plots of land for home food production. This pattern is especially prevalent in the large coffee fincas but also exists on cattle ranches and cotton farms in the coastal region. Colonos represented slightly more than 10 per cent of all farm units in the country and about 13 per cent of the small farms in 1966. Inasmuch as they are obligated on a regular basis to work on the farm where they are living, they represent a special case of small farms in terms of employment and productivity. The land they use is properly part of the large farms on which they live but it was presumably netted out of the farm size data for large farms in the census.

Regional information on tenancy is given in Tables 4-4B, 4-4C and 4-4D. In the coastal region a much larger proportion of small farms was rented than for the country as a whole. This is also the region where there is a relatively large proportion of colonos. The central region showed a higher proportion of owners and a less-than-average proportion of renters and colonos. This again underscores the dominance of small Indian owner-operated farm in this region. In the Peten region almost all farms existed on land which is neither legally owned nor rented. This area is largely in the public domain and no arrangement for sale or lease of land have been made for the few farms which exist there. These farms were classified in "other."

TABLE 4-4B
COASTAL REGION: FARM TENANCY PATTERNS

Farm Size Class	Number of Farms	Owners ¹		Renters		Collective Ownership		Colonos		Other	
		Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms
Less than 0.70 hectares	19,365	4,682	24.2	5,234	27.0	233	1.2	8,047	41.6	1,169	6.0
From 0.70 to 6.99 hectares	38,423	17,299	45.0	11,075	28.8	755	2.0	5,329	13.9	3,965	10.3
From 6.99 to 45.13 hectares	8,143	6,934	85.2	267	3.3	19	0.2	27	0.3	896	11.0
From 45.13 to 902.51 hectares	2,384	2,116	88.8	88	3.7	6	0.2	1	0.0	173	7.3
More than 902.51 hectares	190	167	87.9	5	2.6	--	--	--	--	18	9.5
Coastal Region	68,505	31,198	45.5	16,669	24.3	1,013	1.5	13,404	19.6	6,221	9.1

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes farm units where some land is owned and the remainder is held under a different type of tenancy.

TABLE 4-4C
CENTRAL REGION: FARM TENANCY PATTERNS

Farm Size Class	Number of Farms	Owners ¹		Renters		Collective Ownership		Colonos		Other	
		Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms
Less than 0.70 hectares	65,655	46,321	70.5	6,297	9.6	3,936	6.0	6,700	10.2	2,401	3.7
From 0.70 to 6.99 hectares	239,387	159,151	66.5	23,608	9.9	14,122	5.9	26,336	11.0	16,170	6.7
From 6.99 to 45.13 hectares	35,281	28,764	81.5	390	1.1	1,476	4.2	2,163	6.1	2,488	7.1
From 45.13 to 902.51 hectares	6,011	5,481	91.2	57	0.9	45	0.7	1	0.0	427	7.1
More than 902.51 hectares	196	179	91.3	5	2.6	1	0.5	--	--	11	5.6
Central Region	346,530	239,896	69.2	30,357	8.8	19,580	5.6	35,200	10.2	21,496	6.2

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes farm units where some land is owned and the remainder is held under a different type of tenancy.

TABLE 4-4D
 PETEN REGION: FARM TENANCY PATTERNS

Farm Size Class	Number of Farms	Owners ¹		Renters		Collective Ownership		Colonos		Other	
		Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms	Number of Farms	Per cent of Farms
Less than 0.70 hectares	63	8	12.7	--	--	--	--	--	--	55	87.3
From 0.70 to 6.99 hectares	1,987	88	4.4	--	--	--	--	--	--	1,899	95.6
From 6.99 to 45.13 hectares	232	14	6.0	--	--	--	--	--	--	218	94.0
From 45.13 to 902.51 hectares	25	14	56.0	--	--	--	--	--	--	11	44.0
More than 902.51 hectares	2	1	50.0	--	--	--	--	--	--	1	50.0
Peten Region	2,309	125	5.4	--	--	--	--	--	--	2,184	94.6

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes farm units where some land is owned and the remainder is held under a different type of tenancy.

TABLE 4-5
GUATEMALA: TYPE OF FARM MANAGEMENT

Farm Size Class	Number of Farms	Owner-Operated*		Hired Manager	
		Number of Farms	Per cent	Number of Farms	Per cent
Less than 0.70 hectares	85,083	84,879	99.8	204	0.2
From 0.70 to 6.9 hectares	279,797	279,246	99.8	551	0.2
From 7.0 to 44.9 hectares	43,656	43,224	99.0	432	1.0
From 45.0 to 899.9 hectares	8,420	6,614	78.6	1,806	21.4
More than 900.0 hectares	388	127	32.7	261	67.3
Guatemala	417,344	414,090	99.2	3,254	0.8

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

*Includes renter-operated, colonos and collective farms.

4.3.1 Type of Farm Management

The census of 1964 classified farms according to whether they were operated directly by their owners or whether a hired manager was used (Table 4-5). As would be expected, there is little hired management in the small and middle size classes. About two-thirds of the very large farms, however, were operated with hired managers. Slightly more than 20 per cent of the two large farm classes taken together were administered by employed managers. About 2000 farms over 45 hectares in size fell in this "hired management" class in the 1964 census. This is the group of farms to which the "absentee-ownership" label is often applied. Unfortunately it was not possible to cross-classify data on land utilization, production practices or productivity with tenancy to determine if this group of farms performed more poorly than owner-managed farms of comparable size.

Tenancy per se does not seem to constitute a serious barrier to agricultural progress in Guatemala. A high percentage of farms are owner-operated although the owners may not always be able to produce a clear legal title. The pattern of small farm ownership is most highly established in the central region. In the coastal region, there are larger numbers of small farmers who rent land or use land as "colonos." Titles are also more in question in some of the newer areas of the coastal regions. These factors will make it more difficult to reach small farmers in the coastal areas through conventional credit and technical assistance programs.

4.4 Land Utilization

The most controversial aspect of farm size is the question of land utilization. There is no doubt that land in small farms is used intensively although usually with primitive techniques and at low levels of technology. Is the land in large farms also used intensively? Do large farmers apply the best methods and technology that are known and profitable to use? This section will analyze this problem with regard to land use. The questions of production practices and productivity will be discussed in the following sections.

The first problem is to decide what land can be used if judgments are to be rendered about whether it is used. Census data were grouped into three basic classes: land for cultivation, land in natural and permanent pastures, and land which cannot be utilized (Table 4-6A). These data were then tabulated by size of farm. The results are rather remarkable and indicate graphically one of the fundamental problems of organization and resource utilization in the agricultural sector.

In Table 4-6A the first column of particular interest is the one showing the percentage of land which is available for crop production. This figure declines dramatically with the size of farm. Cultivable land in small farms represents 80 to 95 per cent of total land while for the very large farms it represents as little as 25 per cent of the total.

A somewhat better picture of land used for production can be gained by looking also at land in natural and permanent pastures. This is an important category of land use for the family and large size farms; it is much less important for small farms. Adding these two uses together improves the picture for the large farms. Land utilizable for

TABLE 4-6A
 GUATEMALA: LAND UTILIZATION BY SIZE OF FARM

Farm Size Class	Number of Farms	Area	Area Which can be Cultivated	Per cent Cultivable	Area in Pastures ¹	Per cent in Pastures	Land not Subject to Utilization ²	Per cent not Utilizable
Less than 0.70 hectares	85,083	32,619.2	30,614.5	93.9	497.5	1.5	1,507.2	4.6
From 0.70 to 6.99 hectares	279,797	607,855.6	486,655.3	80.0	48,951.5	8.1	72,248.9	11.9
From 6.99 to 45.13 hectares	43,656	648,900.2	321,525.2	49.5	170,430.0	26.3	156,945.0	24.2
From 45.13 to 902.51 hectares	8,420	1,258,545.2	421,422.3	33.5	510,092.3	40.5	327,030.6	26.0
More than 902.51 hectares	388	894,600.4	233,248.3	25.0	284,033.8	31.7	387,318.3	43.3
Guatemala	417,344	3,442,520.6	1,483,465.6	43.1	1,014,005.1	29.4	945,050.0	27.5

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes natural and permanent pastures.

²Includes mountains, forests and other non-usable land.

TABLE 4-6A--Continued

Area Which Can be Cultivated					
Planted Area ³	Per cent Planted	Land in Tree and Other Permanent Crops		Fallow	
		Land in Tree and Other Permanent Crops	Per cent in Tree and Other Permanent Crops	Fallow	Per cent Fallow
26,927.9	88.0	2,723.0	8.9	963.6	3.1
368,764.1	75.8	35,340.8	7.3	82,550.4	16.9
155,646.1	48.4	32,970.7	10.3	132,908.4	41.3
139,709.2	33.2	165,476.6	39.3	116,236.5	27.5
55,366.0	24.8	82,333.0	36.9	85,549.3	38.3
746,413.3	50.3	318,844.1	21.5	418,208.2	28.2

³Includes animal crops, forage and pasture crops and land where the harvest was lost.

crops and pasture ranges from 95 per cent for small farms to 57 per cent for the very large farms.

The data in Table 4-6A on land not subject to productive utilization simply accept the census classification. Obviously, what land can or cannot be utilized is a function of choice and necessity as much as of physical reality. Much land in the highlands which has been cropped for years is as "unutilizable" in physical terms as forest and hill land classified as such in large farms. But small farmers have no choice and must eke out their bare subsistence with the land they have. Large farms have the option of using only that part of their land best suited for crops or pasture.

The remainder of Table 4-6 analyzes the use of land in cultivation by size of farm. Use is classified by annual crop production and land with tree and other permanent crops. The remaining cultivable land was fallow during the census year.

Small farms use almost all of their cultivable land each year for annual crops. This fact is consistent with the economic reality of the subsistence farmer. For the census year, about one-third of the cultivable land in the two large farms classes was not utilized. The proportion of fallow land, however, was highest for middle-sized farms. This fact bears further investigation and explanation.

These data suggest but do not prove a significant degree of underutilization of land in farms in the commercial sector. What would constitute economically efficient utilization can only be known through cadastral surveys and research designed to develop and test profitable cropping patterns and production practices. Another form of inefficient utilization is the intensive cropping of soils using primitive

techniques and poor technology as practiced in the subsistence sector. Optimum management of these small farms to maximize production per hectare over time must also be determined through research. Both of these research areas deserve high priority.

Data on land utilization by region is given in Tables 4-6B, 4-6C and 4-6D. There are some notable regional differences. The coastal region had a slightly lower proportion of cultivable land but a much higher proportion of land in pastures than was true overall. As a result, less land in the coast was classified as "not utilizable." Conversely, there was a slightly larger proportion of cultivable land recorded in the central zone but a much lower proportion of pasture, resulting in a somewhat higher degree of unproductive land. In both major regions, most of the land considered unproductive is included in the large farms.

The proportion of cultivable land which was fallow in 1964 was higher in the central region than in the coast. This was true for all size classes but especially for larger farms; only about 50 per cent of cropland in mid- and large-sized farms was used for production during the census year. In the central region, the largest farms used the lowest percentage of their crop land while in the coast the middle-size group left the largest proportion of land idle.

4.5. Livestock Production

The census of 1964 included information about the number of livestock on farms. This information is given in Table 4-7 by farm size classes. Subsistence farms have little pasture land and few cattle. A small proportion had herds of two or three cows used to produce

TABLE 4-6B

COASTAL REGION: LAND UTILIZATION BY SIZE OF FARM

Farm Size Class	Number of Farms	Area (hectares)	Area Which can be Cultivated (hectares)	Per cent Cultivable	Area in Pastures ¹ (hectares)	Per cent in Pastures	Land not Subject to Utilization ² (hectares)	Per cent not Utilizable
Less than 0.70 hectares	19,365	7,225.0	7,076.2	97.0	60.9	0.8	88.2	1.2
From 0.70 to 6.99 hectares	38,423	72,389.3	64,761.9	89.5	4,771.7	6.6	2,855.8	3.9
From 6.99 to 45.13 hectares	8,143	135,495.8	75,935.6	56.0	40,573.2	30.0	18,987.6	14.0
From 45.13 to 902.51 hectares	2,384	448,381.2	168,435.1	37.6	209,877.3	46.8	70,068.8	15.6
More than 902.51 hectares	190	456,310.4	120,620.7	26.4	186,356.2	40.8	149,333.6	32.7
Coastal Region	68,505	1,119,801.7	436,829.5	39.0	441,639.3	39.4	241,334.0	21.5

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes natural and permanent pastures.

²Includes mountains, forests and other non-usable land.

TABLE 4-6B--Continued

Planted Area ³	Area Which can be Cultivated				
	Per cent Planted	Land in Tree and Other Permanent Crops	Per cent in Tree and Other Permanent Crops	Fallow	Per cent Fallow
6,232.7	88.1	781.2	11.0	62.3	0.9
49,084.4	75.8	10,773.1	16.6	4,904.4	7.6
39,447.3	51.9	14,162.8	18.7	22,325.5	29.4
70,847.9	42.1	74,593.9	44.3	22,993.3	13.6
41,285.1	34.2	54,269.0	45.0	25,066.6	20.8
206,897.4	47.4	154,580.0	35.4	65,352.1	17.2

³Includes annual crops, forage and pasture crops and land where the harvest was lost.

TABLE 4-6C

CENTRAL REGION: LAND UTILIZATION BY SIZE OF FARM

Farm Size Class	Number of Farms	Area (hectares)	Area Which can be Cultivated	Per cent Cultivable	Area in Pastures ¹	Per cent in Pastures	Land not Subject to Utilization ²	Per cent not Utilizable
Less than 0.70 hectares	65,655	25,373.2	23,513.8	92.7	436.6	1.7	1,419.0	5.6
From 0.70 to 6.99 hectares	239,387	530,392.8	415,955.4	78.4	44,139.2	8.3	69,261.7	13.1
From 6.99 to 45.13 hectares	35,281	509,877.9	243,029.4	47.7	129,501.9	25.4	137,740.8	27.0
From 45.13 to 902.51 hectares	6,011	807,050.4	251,913.9	31.2	298,869.2	37.0	256,124.0	31.7
More than 902.51 hectares	196	435,428.0	102,602.4	23.6	95,883.1	22.0	237,729.0	54.6
Central Region	346,530	2,308,122.3	1,037,014.9	44.9	568,830.0	24.6	702,274.5	30.4

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes natural and permanent pastures.

²Includes mountains, forests and other non-usable land.

TABLE 4-6C--Continued

Area Which Can be Cultivated					
Planted Area ³	Per cent Planted	Land in Tree and Other Permanent Crops		Fallow	
		Land in Tree and Other Permanent Crops	Per cent in Tree and Other Permanent Crops	Fallow	Per cent Fallow
20,680.5	87.0	1,935.5	8.2	897.8	3.8
315,060.3	75.7	24,321.0	5.8	76,574.1	18.4
115,010.2	47.3	18,715.0	7.7	109,304.2	45.0
68,509.8	27.2	90,835.9	36.1	92,568.2	36.7
14,057.1	13.7	28,062.6	27.4	60,482.7	58.9
533,317.9	51.4	163,870.0	15.8	339,827.0	32.8

³Includes annual crops, forage and pasture crops and land where the harvest was lost.

TABLE 4-6D

PETEN REGION: LAND UTILIZATION BY SIZE OF FARM

Farm Size Class	Number of Farms	Area (hectares)	Area Which Can be Cultivated		Area in Pastures ¹		Land not Subject to Utilization ²	
			Per cent Cultivable	Per cent in Pastures	Land not Subject to Utilization ²	Per cent not Utilizable		
Less than 0.70 hectares	63	21.0	24.5	116.6	--	--	--	--
From 0.70 to 6.99 hectares	1,987	5,073.5	5,938.0	117.0	40.6	0.8	131.4	2.6
From 6.99 to 45.13 hectares	232	3,526.5	2,560.2	72.6	354.9	10.1	216.6	6.1
From 45.13 to 902.51 hectares	25	3,113.6	1,071.9	34.4	1,345.8	43.2	837.8	26.9
More than 902.51 hectares	2	2,862.0	25.2	0.9	1,794.5	62.7	255.7	8.9
Peten Region	2,309	14,596.6	9,619.8	65.9	3,535.8	24.2	1,441.5	9.9

Source: Second Agricultural Census, 1964. Census Bureau, Guatemala.

¹Includes natural and permanent pastures.

²Includes mountains, forests and other non-usable land.

TABLE 4-6D--Continued

Planted Area ³	Per cent Planted	Area Which Can be Cultivated			
		Land in Tree and Other Permanent Crops	Per cent in Tree and Other Permanent Crops	Fallow	Per cent Fallow
14.7	60.0	6.3	25.7	3.5	14.3
4,619.4	77.7	246.7	4.2	1,071.9	18.1
1,188.6	46.4	92.9	3.7	1,278.7	49.9
350.1	32.7	46.8	4.4	675.0	62.9
23.8	94.4	1.4	5.6	--	--
6,196.6	64.4	394.1	4.1	3,029.1	31.5

³Includes animal crops, forage and pasture crops and land where the harvest was lost.

TABLE 4-7
GUATEMALA: LIVESTOCK ON FARMS, 1964

Farm Size Class	Number of Farms	Land in Pasture ¹ (hectares)	Beef Cattle				Dairy Cattle			
			Number of Farms with Beef Cattle	Number of Beef Cattle	Average per Farm	Per cent Beef Animals in Farm Size Class	Number of Farms with Dairy Cattle	Number of Dairy Cattle	Average per Farm	Per cent Dairy Animals in Farm Size Class
Less than 0.70 hectares	85,083	497.5	5,400	13,082	2.4	1.2	854	1,378	1.6	1.7
From 0.70 to 6.99 hectares	297,797	48,951.5	44,302	161,507	3.6	14.5	7,254	11,895	1.6	14.4
From 6.99 to 45.13 hectares	43,656	170,430.0	19,007	190,958	10.0	17.2	5,471	10,641	1.9	12.9
From 45.13 to 902.51 hectares	8,420	510,092.3	6,120	482,267	78.8	43.4	2,838	48,171	17.0	58.2
More than 902.51 hectares	388	284,033.8	305	263,511	864.0	23.7	176	10,658	60.6	12.8
Total, Guatemala	417,344	1,014,055.1	75,134	1,111,325	14.8	100.0	16,593	82,743	5.0	100.0

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Includes natural and permanent pasture.

TABLE 4-7--Continued

Hogs				Sheep				Chickens			
Number of Farms With Hogs	Number of Hogs	Average per Farm	Per cent Hogs in Farm Size Class	Number of Farms With Sheep	Number of Sheep	Average per Farm	Per cent Sheep in Farm Size Class	Number of Farms With Chickens	Number of Chickens	Average per Farm	Per cent Chickens in Farm Size Class
10,395	17,970	1.7	7.5	5,586	36,794	6.6	6.9	32,111	391,890	37.7	12.2
56,902	147,098	2.6	61.5	32,816	356,954	10.9	66.5	149,068	2,680,521	53.3	18.0
14,693	49,341	3.4	20.6	7,534	125,027	16.6	23.3	28,723	1,016,157	65.8	35.4
2,869	21,613	7.5	9.0	751	16,531	22.0	3.1	4,692	409,902	55.7	87.4
108	3,346	31.0	1.4	37	1,237	33.4	0.2	161	33,181	41.5	206.1
84,967	239,368	2.8	100.0	46,724	536,543	11.5	100.0	214,755	4,531,651	51.5	21.1

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meat and milk mainly for home consumption. Even in the middle-size group, less than half of the farms had beef animals and only about 10 per cent had dairy cows. Herd sizes were relatively small. About two-thirds of all beef and dairy cows were on large farms. Nearly all of the very largest farms had beef herds; the average herd size of 864 animals suggests that large-scale operations are quite common. Almost half of the very large farms also had dairy herds, with an average size of 60 cows per farm.

This situation is different in the case of hogs, sheep and poultry. These are the livestock products of the subsistence sector. Small farms accounted for two-thirds of each of these classes of livestock in the census year. Middle-sized farms were also important producers of these types of animals.

What is lacking in the census data is any indication of the efficiency of livestock production. How many animals of what age are sold for meat each year? What are the birth and death rates for calves, pigs and lambs? How much milk is produced per cow? How many eggs are produced per hen each year? These figures are undoubtedly low and would show that much could and should be done to improve production of livestock products.

4.6 Agricultural Production Practices

Certain important aspects of resource use patterns were covered in the census of 1964. These data have been tabulated by size of farm and are presented in Table 4.8.

The first aspect to be examined is the type of energy used on farms. Production on small farms is carried out almost entirely by

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TABLE 4-8
GUATEMALA: AGRICULTURAL PRODUCTION PRACTICES

Farm Size Class	Number of Farms	Area in Crop Production (hectares)	Energy Used in Production (per cent)			Fertilizer Use			
			Mechanical and Human	Animal and Human	Human only	Number of Farms Using Fertilizer	Per cent of Farms Using Fertilizer	Per cent of Farms Using Natural Fertilizer Only	Per cent of Farms Using Chemical Fertilizer ¹
Less than 0.70 hectares	85,083	30,614.5	0.1	2.5	97.4	29,006	34.1	88.3	19.5
From 0.70 to 6.99 hectares	279,797	486,655.3	0.3	6.7	93.0	88,617	31.7	83.1	28.3
From 6.99 to 45.13 hectares	43,656	321,525.2	1.8	14.4	83.8	15,260	35.0	78.8	36.1
From 45.13 to 902.51 hectares	8,420	421,422.3	13.1	26.5	60.4	3,867	45.9	62.9	62.0
More than 902.51 hectares	388	223,248.3	40.2	10.3	49.5	261	67.3	51.7	79.3
Total, Guatemala	417,344	1,483,465.6	0.7	7.0	92.3	137,011	32.8	83.1	28.4

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala

¹Includes farms using natural and chemical fertilizers.

TABLE 4-8--Continued

Quantity of Chemical Fertilizer Used	Irrigation				Colonos		
	Number of Farms Having Irrigation	Area Irrigated	Per cent of Crop Area Irrigated	Average Area Irrigated of Farms With Irrigation	Number of Farms With Colonos	Number of Colonos	Average Number per Farm
424.7	1,868	384.3	1.3	0.2	98	145	1.5
3,498.5	8,634	4,634.7	1.0	0.5	664	2,163	3.3
2,514.2	2,576	4,587.2	1.4	1.8	1,377	5,583	4.1
20,276.3	1,230	22,032.6	5.2	17.6	2,767	58,594	21.2
7,465.4	83	20,716.9	9.3	249.6	311	36,344	116.9
34,181.1	14,391	52,355.7	3.5	3.6	5,217	102,829	19.7

human labor. A very small proportion of these farms used animal power but mechanical power was almost unknown in the subsistence sector. It is somewhat surprising that production using hand labor was also dominant in the middle and large farm groups. Even 50 per cent of the largest farms reported production solely with human labor. The only significant use of mechanical energy was found in the large farm groups.

The census data on fertilizer showed that only about one-third of the small and medium farm size groups used it while one-half to two-thirds of the large farmers did. Moreover, natural fertilizer was used almost exclusively in the subsistence sector. Chemical fertilizers were used widely only on large farms. Other sources suggest that of current use of chemical fertilizer, one-half goes to coffee, one-fourth to cotton, and the remaining one-fourth to all other crops.¹

Irrigation has not been widely developed in Guatemala. In 1964 only 3.5 per cent of the total cultivable area was irrigated. What irrigated acreage existed was controlled mostly by large farms. More attention needs to be given to irrigation and drainage, especially to their potential role in intensifying land use through double cropping. Often, response to new inputs such as fertilizer and improved seed may depend on complementary investments in irrigation and/or drainage systems.

Finally, Table 4-8 gives information about the number of colonos. These are found largely on large farms and their presence explains the labor-intensive production methods mentioned above. The number of colonos reported in this table is more than twice the number shown in

¹Information supplied by Dr. J. Walker and associates.

Table 4-4A as operating their own farm plots. These additional colonos represent an important proportion of the landless laborer class in the rural sector. As previously noted, this group seems to be growing quite rapidly, especially in the coastal areas.

4.7 Crop Production and Yields

Cropping patterns can have an important influence on the efficiency of agricultural production. Where are the major crops produced? Which crops are produced by large farmers and which by small farmers? How do yields vary by region and size of farm? Are yields increasing or decreasing? Answers to these questions will help to diagnose basic production problems and to suggest ways to seek improvements in the agricultural sector.

Census data on the number of producers, area and production of major crops were obtained and classified by size of farm. These data do not seem comparable to other production data; the area and quantity information obtained by the census was lower for all major crops than the data from other sources. They are presented here with this major qualification and for the primary purpose of comparing patterns of production and yields among farm size classes.

4.7.1 How Has the Agricultural Sector Grown?

If sufficient data were available, the growth rates in agricultural output discussed in Chapter 3 could be explained in terms of changes in inputs. Ideally it would be possible to show how much of the change in output was accounted for by more land, more labor, fertilizer, improved seed and other inputs and practices. A substitute for a detailed production function analysis is to allocate overall growth in

output into three components: an area component, a yield component, and a residual component which primarily reflects changes in the output mix. The relative magnitude of these components will indicate whether agricultural growth has primarily reflected an expansion in the land base, an increase in production per unit of land, or a shift to higher-valued crops.

Area and production data were obtained for 7 crops, representing about 70 per cent of the total value of crop production, for the 1950-1966 period. These crops were grouped into export crops (coffee, cotton, sugar) and domestic crops (corn, wheat, beans, rice). Average annual rates of growth for each group and the total are shown in Table 4-7.

TABLE 4-7
AVERAGE ANNUAL GROWTH RATES IN PRODUCTION,
AREA AND YIELD, 1950-1966

	Export Crops	Domestic Crops	Total
Value of Production	6.61	4.08	5.81
Area	3.96	1.70	2.28
Yield	2.22	1.26	1.91
Product-Mix	0.43	1.12	1.62

The results show that the total output of these crops grew at almost 6 per cent per year in the 1950-1966 period. The most rapid growth was in the export-crop group where output increased more than 6 per cent per year. The domestic-crop group grew at a more

moderate 4 per cent per year.

For each group, growth in yields per unit of land has accounted for only about one-third of the increased output. Expansion of area has been more important than yields in producing growth, however. This is especially true for the export crop group where almost two-thirds of the total change was accounted for by growth in area. The low absolute and relative growth in yields, especially for domestic crops, indicates the urgency of programs designed to raise the productivity of land already in production. The necessity for doubling or tripling annual increases in yields will call for new approaches and different priorities in development planning.

4.7.2 Corn Production and Yields

Corn is the most widely produced crop in Guatemala. More than 90 per cent of all farms in the country produced corn in 1964. This figure is higher in some departments and even approaches 100 per cent in departments where subsistence agriculture predominates (Table 4-8). Land devoted to corn represented 78 per cent of the total land used for annual crops in 1964. This figure was 88 per cent in the central region as contrasted to only 52 per cent in the coastal region. The importance of corn is especially strong for small farmers; not only is corn practically a universal crop for them, it is also the crop to which most of their land is devoted. Small farmers account for more than 60 per cent of the production of corn.

Comparative yields by size of farm for 1964 are shown in Table 4-9. The table includes data for corn grown as a single crop and for first crop corn where double-cropping is practiced. Yields were highest for

TABLE 4-8

GUATEMALA: NUMBER OF FARMERS PRODUCING CORN AND
AREA PLANTED TO CORN, BY DEPARTMENT AND REGION

Department	Number of Farms	Per cent of Farms	Area Planted to Corn	Per Cent of Area Cropped
Guatemalan Total	387, 078	92.9	525, 141.6	77.8
Coastal Region Total	61, 118	89.2	96, 604.1	51.8
Escuintla	15, 044	87.5	31, 541.8	37.2
Santa Rosa	18, 078	98.8	21, 951.6	87.4
Suchitepéquez	12, 221	79.5	13, 621.2	60.6
Retalhuleu	9, 214	87.4	17, 485.2	45.2
Izabal	6, 561	92.4	12, 004.3	77.8
Central Region Total	324, 128	93.5	423, 376.6	87.8
Guatemala	15, 716	92.5	22, 310.7	93.3
El Progreso	6, 820	99.6	10, 972.3	87.6
Sacatepéquez	8, 016	98.3	8, 824.4	86.7
Chimaltenango	21, 173	99.8	28, 400.2	86.8
Sololá	13, 305	84.8	10, 829.0	83.7
Totonicapán	18, 518	81.7	10, 456.6	74.5
Quezaltenango	22, 184	85.3	18, 316.0	67.7
San Marcos	36, 309	89.6	31, 080.6	75.6
Huehuetenango	41, 073	98.5	56, 442.0	92.1
El Quiché ¹	37, 308	100.0	50, 946.4	97.0
Baja Verapaz ¹	13, 831	100.0	24, 726.9	95.8
Alta Verapaz	31, 189	84.5	60, 795.8	96.0
Zacapa	6, 656	92.2	11, 808.7	77.3
Chiquimula ¹	17, 199	100.0	21, 361.8	87.4
Jalapa	11, 938	92.9	22, 420.4	93.1
Jutiapa ¹	21, 429	100.0	33, 684.8	81.2
Peten Region ¹	2, 309	100.0	5, 160.9	96.1

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

¹Original data showed more farms producing corn than farms listed in Cenus; numbers used equal to number of farms and overall total adjusted.

TABLE 4-9
 GUATEMALA: NUMBER OF PRODUCERS OF SINGLE-CROP CORN, AREA,
 PRODUCTION AND YIELD, BY SIZE OF FARM

Farm Size Class	Number of Farms	Per cent of Farms	Area (has.)	Production (metric tons)	Yield (kg/ha)
Less than 0.70 hectares	62,803	80.4	22,612	22,045	975.0
From 0.70 to 6.99 hectares	218,914	75.1	257,949	206,903	802.3
From 6.99 to 45.13 hectares	33,809	73.0	105,339	84,847	805.0
From 45.13 to 902.51 hectares	5,095	71.0	41,094	41,925	1,020.1
More than 902.51 hectares	167	79.5	11,543	15,354	1,335.1
Guatemala, Total	320,788	75.8	438,537	371,074	846.2

Source: Second Agricultural Census, 1964.

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large farms. This is most likely because improved seed, fertilizer and other modern practices are used on large farms. Yields were also higher for the smallest farms than for the small and medium size groups. A higher labor input and more intensive production practices probably account for this difference. Yields were lowest for the size classes representing the largest number of corn producers and the greatest area of corn production. These low yields reflect unimproved seed, lack of fertilizer, poor soil and inadequate crop rotation and pest control. These are the producers who must be reached and the conditions that must be overcome if widespread increases in corn yields are to be obtained.

Some corn is produced in Guatemala under two production practices which have important implications for yields: interplanting with other crops, especially beans, and double cropping of the same land. The interplanting practice is more prevalent among small farmers than among large ones and is practiced more frequently in the highland region than in the coast. Yields were generally lower for interplanted corn in 1964 (Table 4-10). While this practice is frequently criticized, no one really seems to know what alternatives would permit the peasant producer to produce his basic food supply with more certainty. Serious recommendations for change should be firmly based on results of research at the level of the subsistence farmer.

Double-cropping is a means for more intensively utilizing the same land resources. It can be practiced where temperatures and rainfall (both annual amounts and distribution over the year) permit other than seasonal production. Quite often, successful double-cropping depends upon complementary investments in drainage or irrigation to

TABLE 4-10
 GUATEMALA: PRODUCTION AND YIELDS FOR CORN INTERPLANTED
 WITH OTHER CROPS

Farm Size Class	Number of Farms	Per cent of Farms	Area Interplanted (Has.)	Production (metric tons)	Yields
Less than 0.70 hectares	6,696	8.6	2,516	2,006	797.3
From 0.70 to 6.99 hectares	52,499	18.0	59,449	7,332	627.9
From 6.99 to 45.13 hectares	8,803	19.0	19,934	12,763	640.2
From 45.13 to 902.51 hectares	1,441	20.1	7,178	4,932	687.1
More than 902.51 hectares	22	10.5	400	426	1,065.0
Guatemala, Total	69,461	16.4	89,477	57,459	642.2

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala

extend the effective growing season.

Double-cropping should be expected to increase the yield per hectare per year if it is to be economical. It is not necessarily true that it should increase the yields per crop produced. This would hold, for example, if shorter-maturing corn varieties were used to permit two crops per year. As a result of the varietal difference and possibly because of poorer growing conditions for the second crop, each of the two crops would probably yield less than a longer-maturing variety planted during the most favorable part of the growing season. The data in Table 4-11 do suggest that the yield per crop is substantially lower for the second corn crop. However, the total production per hectare per year, or of the two successive crops considered jointly, would be expected to be larger than the yields given in Table 4-9.

Because of the importance attached to the question of production in the subsistence sector, it could be essential to know where corn yields are highest and lowest and if corn yields are tending to decline or increase in any part of the country. Table 4-12 shows yields by zone for the years in which area data are available. Yields appear to have been rising as much as 1 to 2 per cent per year for that country as a whole. Yields are highest in the coastal departments of Escuintla, Suchitepequez and Retalhuleu (Zone 2) and are also increasing most rapidly there. Yields are also relatively high in the departments of Quezaltenango and San Marcos (Zone 3). There appears to have been declines in yields in Huehuetenango and El Quiché (Zone 5) and possibly in Chiquimula and Jalapa (Zone 8). The data show that yields vary a great deal from zone to zone and from year to year. This

TABLE 4-11
 GUATEMALA: PRODUCTION AND YIELDS OF CORN
 PRODUCED AS SECOND CROP

Farm Size Class	Number of Farms	Per cent of Farms	Area (Has.)	Production (metric tons)	Yields
Less than 0.70 hectares	8,564	11.0	3,167	2,569	828.7
From 0.70 to 6.99 hectares	20,077	6.9	21,347	12,667	594.7
From 6.99 to 45.13 hectares	3,692	8.0	12,329	6,813	554.0
From 45.13 to 902.51 hectares	637	8.9	4,512	3,032	673.8
More than 902.51 hectares	21	10.0	1,128	1,035	941.0
Guatemala, Total	32,991	7.8	42,483	26,116	615.9

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala

TABLE 4-12
GUATEMALA: CORN YIELDS BY ZONE
(Kg/Ha)

Zone ^a	Crop Year													
	1949-50	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67
1	507	508	542	606	506	620	602	607	593	624	481	481	687	856
2	1,132	1,177	1,022	1,107	1,147	1,265	1,096	1,512	1,580	1,359	1,238	1,238	1,630	1,712
3	935	954	898	1,027	1,087	1,051	957	1,053	994	1,126	1,165	1,165	1,114	1,047
4	573	365	610	650	596	617	679	636	664	709	652	652	832	862
5	678	600	627	667	670	676	674	680	681	719	678	678	643	639
6	757	657	595	750	699	703	729	614	743	852	829	829	1,047	757
7	467	616	468	554	419	517	502	571	564	555	494	494	664	672
8	500	616	502	521	440	597	485	512	577	592	474	474	574	560
9	645	782	677	710	610	700	776	754	808	790	691	691	934	895
Guatemala	685	706	655	732	691	751	734	776	828	896	808	816	954	902

Source: Dirección General de Estadística

^aZones are statistical zones defined as:
 Zone 1 Guatemala, Sacatepequez, Chimaltenango
 Zone 2 Escuintla, Suchitepequez, Retalhuleu
 Zone 3 Quezaltenango, San Marcos
 Zone 4 Solola, Totonicapan
 Zone 5 Huehuetenango, El Quiche

Zone 6 Alta Verapaz, El Peten, Izabal
 Zone 7 El Progreso, Baja Verapaz, Zacapa
 Zone 8 Chiquimula, Jalapa
 Zone 9 Santa Rosa, Jutiapa

variation increases the risks associated with corn production especially where the adoption of new inputs or practices which increase production expenses is concerned.

4.7.3 Other Crops

Beans are the second most widely produced crop and the crop most often interplanted with corn. Like corn, they are a major product of the subsistence sector. In 1964, about 22 per cent of the farmers in the country produced beans and 12 per cent of the area of annual crops was planted to them (Table 4-13). These proportions are higher in departments where subsistence agriculture is most important. Yields of beans have not been increasing and probably have decreased especially in the poorer production areas of the Central region.

The number of producers, area and production of other crops for 1964 are shown in the Appendix tables. Other crops primarily produced by small and medium farmers are: wheat, rice, potatoes, vegetables, sesame seed, peanuts and tobacco. Products that are primarily produced by large farms are cotton, coffee and bananas.

4.8 Implications for Development

The dual structure of Guatemalan agriculture has already been emphasized. Most of the land is in relatively few large farms; this land is used largely for the production of export crops and there are indications that it is used less intensively and efficiently than would be desirable. At the other end of the spectrum is the large number of small farms which exist in the country. Land in these farms is used intensively but at a low level of technology. These small farms mainly produce subsistence crops for home production and sale except for some

TABLE 4-13

GUATEMALA: NUMBER OF PRODUCERS OF BEANS AND
AREA PLANTED, BY DEPARTMENT AND REGION

Department	Number of Farms	Per Cent of Farms	Area Planted	Per cent of Area Cropped
Guatemalan Total	90,493	21.7	83,548.0	12.4
Coastal Region Total	9,576	14.0	8,271.7	4.4
Escuintla	908	5.3	636.6	0.8
Santa Rosa	6,538	35.7	5,737.3	22.8
Suchitepéquez	293	1.9	124.4	0.6
Retalhuleu	288	2.7	75.5	0.2
Izabal	1,549	21.8	1,697.9	11.0
Central Region Total	80,181	23.1	74,988.4	15.5
Guatemala	4,219	24.8	5,021.1	22.0
El Progreso	1,850	27.0	1,262.6	10.1
Sacatepéquez	2,072	25.4	1,152.9	11.3
Chimaltenango	6,206	29.3	7,548.5	23.1
Sololá	2,015	12.8	1,363.2	10.5
Totonicapán	1,558	6.9	1,164.8	8.3
Quezaltenango	1,100	4.2	761.6	2.8
San Marcos	5,885	14.5	3,975.8	9.7
Huehuetenango	8,009	19.2	7,906.9	12.9
El Quiché	13,031	34.9	15,219.9	29.0
Baja Verapaz	3,040	22.0	2,385.5	9.2
Alta Verapaz	9,117	24.7	2,722.3	4.3
Zacapa	2,053	28.5	2,090.6	13.7
Chiquimula	5,626	32.7	4,474.7	18.3
Jalapa	3,363	26.2	4,405.5	18.3
Jutiapa	11,037	51.5	13,532.5	32.6
Petén Region Total	736	31.9	287.9	5.4

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

specialty crops produced for the domestic market.

An important interrelationship exists between the export and subsistence subsectors--the provision of resident and seasonal migratory labor by subsistence farms or production operations in the export crops. The census of 1964 identified almost 50,000 colonos but other sources suggest that there were as many as 90,000 full-time resident workers on coffee and cotton farms alone in 1965-1966. This number could easily have reached 100,000 for all large farms in the country.

Available estimates show that the number of part-time workers employed in coffee and cotton in 1965-1966 was on the order of 400,000. A large proportion of these workers were migrants who came from the small farms in the highlands to work in the coffee and cotton harvests and who then returned to their own small farms to produce corn and beans. This pattern is quite complementary in the sense that the peak demands for labor in coffee and cotton are mostly in the off-season for production in the highlands. Thus, the migratory labor is largely drawn from the pool of workers who would otherwise be seasonally unemployed. The wages earned by the migrants represent an important contribution to the total income of the family.

It has been suggested that the availability of a large pool of temporary workers willing to work for low wages discourages efficiency in export crop production and maintains marginal coffee farms in production. Historically, various forms of coercion have been used to insure a sufficient supply of seasonal workers at very low wages. Currently, wage rates and working conditions have been improved, at least slightly, and wage rates probably reflect the low-opportunity costs

of labor at home in the highland areas. Improvements in labor productivity in the subsistence sector could elevate opportunity costs for this labor, raise wages for migratory workers and create pressure for improved efficiency in export production.

Very little information could be obtained on income and capital flows in the agricultural sector. For cotton, there was some indication that of the total export earnings, approximately one-fourth goes to pay for imported inputs, one-half goes for domestic inputs, and the remaining one-fourth represents profits for the producer. The allocation of these profits between consumption and investment in agriculture or other sectors is not known. Similarly, there is no indication of the extent to which export earnings from coffee, meat, bananas or sugar are invested in increased production in agriculture or other sectors in the country.

Neither could systematic information on income distribution in agriculture be located. The extreme inequality in farm size distribution strongly suggests a like inequality in income distribution. Certainly, the large numbers of farm families with small plots of poor soil have minimal incomes even if they are able to supplement their production of subsistence crops by some work off-farm. This fact is supported by the few studies that could be located that contained data on income levels of small highland farmers.¹

The low productivity of this class of farmers is also evident. Farmers working small plots of land with primitive tools and traditional

¹For example, G. W. Hill, "The Guatemalan Highlands Indian and His Poverty Agriculture" (unpublished manuscript, 1966).

inputs will never produce much per man nor per unit of land. One dimension of the productivity problem in agriculture is shown in Table 4-14. This table indicates that output per worker in agriculture was almost half as large as output per worker in manufacturing in 1950 but that it had declined to little more than one-third by 1964. If rates of change of output in agriculture and industry in the 1960-1967 period are projected, and the labor forces in agriculture and industry continue to grow as they did in the 1950-1964 period, output per worker in agriculture will grow slightly in absolute terms but will continue to decline relative to manufacturing. By 1980 it would be little more than 20 per cent as large in agriculture as in industry.

The necessity to increase productivity--and the rate of growth in productivity--of labor in agriculture is a clear implication. New inputs and improved practices which raise yields per acre are one way to approach the productivity problem. Giving more and/or better land to small farmers is another. Moving labor out of agriculture and mechanizing production is still a third. These alternatives must be evaluated in terms of their costs and benefits for the economy as a whole if their implications are to be understood and if choices are to be made consistent with overall development goals and objectives.

TABLE 4-14

GUATEMALA: OUTPUT PER WORKER IN AGRICULTURE AND INDUSTRY

	1950	1964	Annual Average Rate of Growth	Projections			
				1970	1972	1975	1980
Agriculture (including forestry and fisheries)							
Gross Domestic Product ¹	239.356	384.762	4.0 ³	474.9	514.1	579.0	705.9
Economically Active Population ²	659.6	861.1	2.0	951.5	1,012.4	1,077.7	1,198.9
GDP Per Person Economically Active	362.9	446.8	2.0	499.1	507.8	537.3	588.8
Manufacturing							
Gross Domestic Product ¹	86.571	179.386	7.5 ³	269.7	310.3	383.0	543.9
Economically Active Population ²	111.5	149.5	2.2	168.1	176.5	190.4	217.0
GDP Per Person Economically Active	776.1	1,180.2	3.4	1,604.4	1,758.1	2,011.6	2,506.5

¹Millions²Thousands³Based on 1960-1967 series.

CHAPTER 5

SUPPLY AND DEMAND PROJECTIONS FOR BASIC FOODS

5.1 Introduction

Supply and demand projections are presently available from several different groups in Guatemala. In general, there is slightly more agreement on what the demand for various products will be than on what the domestic production will be. The more general agreement on the future demand for some food products appears to be due mainly to agreement on future population coupled with some agreement on what the past consumption of the products has been. The lack of agreement on future production in some cases stems from (a) lack of data on past production, (b) differences in assumptions about changes in government programs or the responsiveness of farms to promotion programs, (c) uncertainties about future prices and export possibilities, and (d) differences in projection techniques used.

The lack of accurate data makes it difficult to judge the accuracy of existing projections. Where possible the linear trend of production and demand during the 1950-1966 period has been used as a benchmark for comparison. Unfortunately the 1950-1966 data for some products either does not exist or is considered to be too inaccurate to be useful. Linear trend projections tend to be somewhat more conservative than those based on the rate of growth of output. This

partially accounts for the fact that the projections based on the linear trend are consistently below those developed by the Banco de Guatemala.

Attention in this chapter is centered on supply and demand projections for corn, beans, wheat, rice, fruits, vegetables, beef, pork, poultry, milk and mutton. The relative importance of these products in terms of their value as a percentage of the total value of agricultural products produced for internal consumption in 1966 is as follows:

1. Corn	23.8
2. Milk	13.4
3. Eggs	10.3
4. Pork	8.5
5. Fruits	8.3
6. Beans	7.9
7. Vegetables	7.9
8. Beef	6.7
9. Poultry	3.7
10. Potatoes	1.4
11. Mutton	0.3
12. Other Food Crops	7.1
13. Other Livestock Products	0.7
TOTAL	<u>100.0</u>

In 1966, the total value of agricultural products for internal consumption accounted for about 55 per cent of the value of total agricultural production. The value of agricultural products for industrial use accounted for about 8 per cent of the value of total

agricultural production while the value of agricultural products for export accounted for slightly over 37 per cent of the total.

The supply and demand projections presented in this chapter provide an idea as to what food balances will be if things continue in the future as they have in the past. Food consumption habits will undoubtedly change in the future as relative prices change, as incomes increase and as people become more aware of the importance of balanced diets. Such changes are expected to be gradual, however. Production patterns, on the other hand, could change very rapidly depending on developments in the world market and the success of the various government programs presently being planned. Thus the supply projections presented here provide part of the information necessary to determine what type of government programs are needed. The projections should not be viewed as production or consumption goals.

The supply projections developed for this report were prepared by the Banco de Guatemala. The demand projections were furnished by the Consejo Nacional de Planificación. The techniques used to make the projections varied somewhat from product to product depending on the type of data available. The general procedure used by the Banco de Guatemala to obtain its supply projections was to select a base period, usually 1964-1967, and to assume that the future rate of increase in production from the base period value would be equal to the average rate of increase during the period from 1950 to 1967. The Consejo's demand projections, on the other hand, use the 1967 estimates of demand as a basis and base the rate of increase in demand on a set of assumptions about the rates of increase of population, future income

and the income elasticities for various commodities.

5.2 Grains

Corn is the most important food crop grown in Guatemala. It is grown extensively throughout the country and comprises about 90 per cent of all cereals in the diets of Guatemalans. Beans are the second most important food in the Guatemalan diet. Like corn, they are grown almost everywhere in the country. Heaviest production of beans tends to be located in the departments of Barberena, Chiquimulilla, Ipala and Jalpatagua where yields are highest.

Rice and wheat are becoming increasingly important food grains in Guatemala. Their increased importance reflects the growth of incomes and urban population. The production of rice tends to be concentrated along the Pacific Coast especially in the departments of Jutiapa, Santa Rosa and Suchitepéquez. The department of Izabel, however, has become an important producer of rice in recent years. The production of wheat is concentrated in the sierra, principally in the departments of Quezaltenango, San Marcos, Huehuetenango and Totonicapán.

5.2.1 Corn

The production of corn increased from about 443,000 metric tons in 1950 to over 680,000 metric tons in 1967. The average annual rate of increase in production during this period was about 3 per cent. Corn production varied considerably from year to year during this period. Part of the variation in production may have been due to changes in the price of cotton relative to corn and resulting shifts of land from cotton to corn and later back to cotton. Part can be contributed to changes in

the government's price policies, credit programs, extension programs and changes in the weather. Data on the production and consumption of corn is presented in Table 5.1.

Imports of corn increased suddenly in 1962 to about 26,000 MT and then dropped to around 12,000 MT in 1963 and have since remained below that level. Except for 1962, corn imports have always been less than 2 per cent of national production.

Supply and demand projections for corn are presented in Table 5.2 and illustrated in Figure 5.1. The supply projections developed by the Battelle Memorial Institute (BMI) lie somewhat above those based on the linear trend line and below those prepared by the Banco de Guatemala (BG). The demand projections of the Battelle Memorial Institute are somewhat higher than those prepared by the Consejo Nacional de Planificación (CNP).¹ According to the BMI projections the supply of corn will exceed the demand by about 15,000 MT in 1970 and by 44,000 MT in 1980. Based on the past trend of production and CNP's demand projections, the demand for corn will exceed the supply by about 87,000 MT by 1980. This conclusion is consistent with our findings presented in Chapter 7 on grain storage. It also corresponds with INCAP's belief that for the 1970's "...it is not pessimistic to predict

¹ All references to supply and demand projections made by the Battelle Memorial Institute (BMI) are based on a preliminary version of their report entitled, "Projections of Supply and Demand for Selected Agricultural Products in Central America to 1970, 1975, 1980." This report was done for the United States Department of Agriculture (USDA) in cooperation with the Instituto de Nutrición de Centro America y Panama (INCAP). The final version is to be published by the USDA sometime in 1969.

TABLE 5.1
 PRODUCTION, IMPORTATION AND EXPORTATION OF CORN
 (Thousands of Metric Tons)

Year	Production	Imports	Exports	Apparent Consumption
1950	443.4	0.5	--	443.9
1951	499.7	--	--	499.7
1952	470.2	--	0.1	470.1
1953	436.3	--	0.3	436.0
1954	397.3	--	--	397.3
1955	381.8	5.9	--	387.7
1956	444.7	1.9	--	446.6
1957	454.2	--	--	454.2
1958	477.9	0.2	--	478.1
1959	513.0	--	0.5	512.5
1960	526.3	--	--	526.3
1961	537.4	0.3	1.8	535.9
1962	559.3	26.3	0.6	585.0
1963	698.4	11.9	0.3	710.0
1964	741.0	10.7	--	751.7
1965	732.0	11.1	--	743.1
1966	752.2	--	--	752.2
1967	680.4	8.3	2.7	686.0

Source: Banco de Guatemala

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TABLE 5.2
SUPPLY AND DEMAND PROJECTIONS FOR CORN
(Thousands of Metric Tons)

Year	Supply			Demand		Surplus ^c
	Trend ^a (1)	BMI (2)	BG (3)	CNP (4)	BMI (5)	(1)-(4)= (6)
1970	779.2	788.0	813.6	--	773.0	--
1972	820.2	855.2 ^b	900.4	814.4	833.0 ^b	5.8
1975	881.7	956.0	1,048.3	902.7	923.0	-21.0
1980	984.2	1,158.0	1,350.7	1,071.6	1,114.0	-87.4

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

Notes:

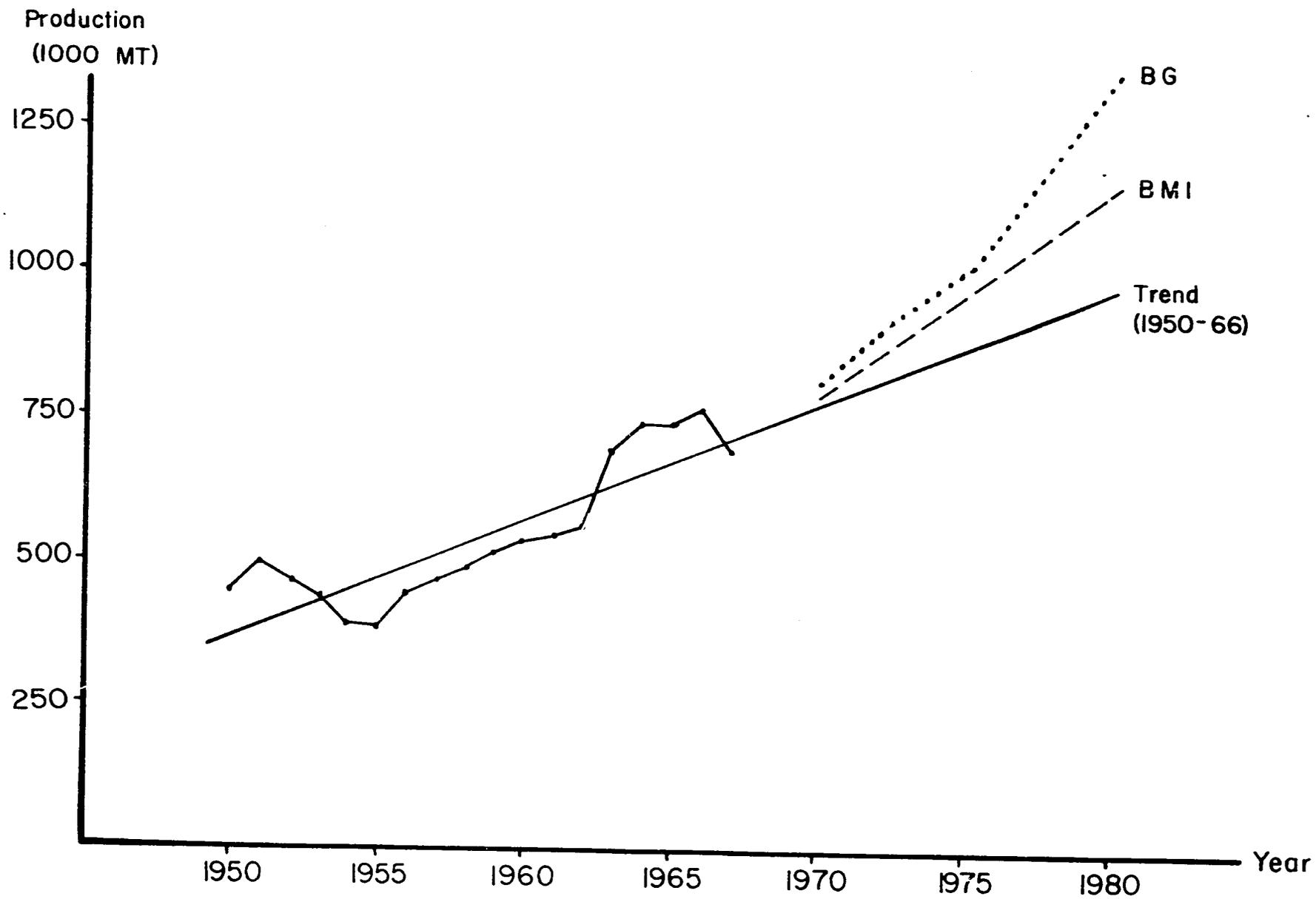
^aLeast-squares trend line is $Q = 533.2 + 20.5 T$ where quantity (Q) is in 1000 MT and time (T) is in annual units with 1958 = 0.

^bObtained by linear interpolation.

^cEstimates are based on trend in supply and CNP's demand projections.

^dAll CNP demand projections presented in this chapter are based on the assumption that gross national product will increase at an annual rate of 4 per cent during 1968-1972 and increase to 5 per cent during 1973-1980.

Figure 5.1: Corn Production and Projections



that the lack of efficient storage and price guarantees will cause a recurrent scarcity of production and consequently an inadequate supply of corn."² Some changes that may help to increase the supply of corn are already underway, however. Additional corn storage and drying facilities are likely to be available within the next several years. There has also been some increase in the use of fertilizers on corn in recent years. Such increases are expected to continue in the future.

5.2.2 Beans

Bean production increased from about 59,000 MT in 1950 to over 112,000 MT in 1966 and then dropped sharply to around 68,000 MT in 1967. The sharp decline in production in 1967 is partly due to adverse weather conditions but also reflects changes in the procedures used by the Dirección General de Estadística to estimate production. The Dirección's data also show a sharp decline in production of several other food products between 1966 and 1967.

Apparent consumption of beans during the 1950-1966 period was approximately identical to production. Imports of beans have increased slightly in recent years but on the average have been less than 2 per cent of national production. Data on production and consumption of beans are presented in Table 5.3.

Supply and demand projections for the 1970 to 1980 period are presented in Table 5.4. The supply projections are illustrated in Figure 5.2. Based on the past trend in production, Guatemala will produce

²From a preliminary version of an INCAP report on the present and future food needs of Guatemala. The report is scheduled for publication in 1969.

TABLE 5.3
 PRODUCTION, IMPORTATION AND EXPORTATION OF BEANS
 (Thousands of Metric Tons)

Year	Production	Imports	Exports	Apparent Consumption
1950	59.4	--	--	59.4
1951	65.1	--	--	65.1
1952	66.1	--	--	66.1
1953	64.2	--	--	64.2
1954	60.3	--	--	60.3
1955	53.8	0.3	--	54.1
1956	62.4	0.3	--	62.7
1957	61.9	0.2	--	62.1
1958	71.8	--	--	71.8
1959	49.0	--	0.1	48.9
1960	79.3	--	0.3	79.0
1961	80.6	--	0.8	79.8
1962	81.9	0.3	0.2	82.0
1963	104.7	1.7	0.2	106.2
1964	111.1	2.4	0.7	112.8
1965	109.8	4.1	0.1	113.8
1966	112.7	--	--	112.7
1967	68.0	3.4	1.9	69.6

Source: Banco de Guatemala

TABLE 5.4
 SUPPLY AND DEMAND PROJECTIONS FOR BEANS
 (Thousands of Metric Tons)

Year	Supply			Demand	
	Trend ^a	BMI	BG	CNP	BMI
1970	133.2	55.0	148.4	--	47.0
1972	143.9	60.6 ^a	159.6	83.2	51.0 ^b
1975	159.9	69.0	177.9	92.5	57.0
1980	186.5	87.0	213.3	110.5	70.0

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

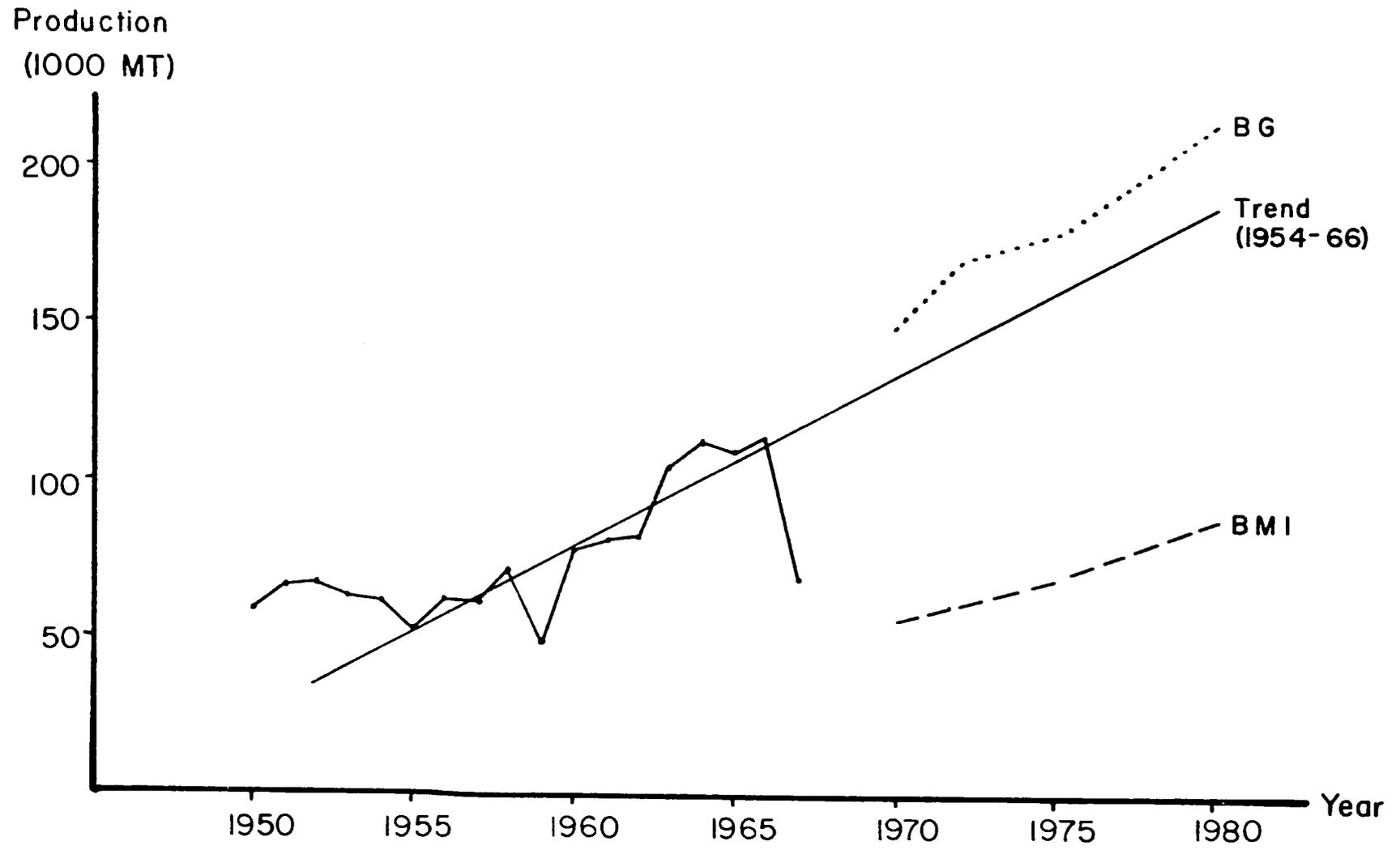
CNP = Consejo Nacional de Planificación

Notes:

^aLeast-squares trend line for production is $Q = 79.95 + 5.33 T$ where Q is 1000 MT and T is in annual units with 1960 = 0.

^bObtained from BMI data using linear interpolation.

Figure 5.2: Bean Production and Projections



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over 143,000 MT of beans in 1972 and over 186,000 MT in 1980. The Consejo Nacional de Planificación estimates that demand will increase from about 83,000 MT to over 110,000 MT during the same period. The Battelle Memorial Institute's (BMI) supply and demand projections are considerably lower than those of the Banco de Guatemala and the Consejo Nacional de Planificación. Even so, BMI projects a surplus of bean production during the 1970's that increases from about 8,000 MT at the beginning of the decade to around 17,000 MT by 1980.

The production projections based on the least-squares trend line for the 1954-1966 appear to be the most appropriate for planning purposes. We expect consumption to be approximately equal to production. The CNP and BMI projections of demand appear to be rather low. The low projections of the CNP are due to its use of 1967 as a base period for making projections. The BMI projections appear to be based on INCAP's estimates which suggest that the demand for beans will increase from around 43,000 MT in 1970 to slightly over 53,000 MT in 1980. The diversity in these projections stems from considerable uncertainty as to what the past production of beans has actually been.

5.2.3 Wheat

One would expect the data on the supply and demand for wheat to be considerably more accurate than the data for most other agricultural commodities. Most of the domestic production and nearly all imports of wheat are presently processed by some 14 flour mills which are members of the Asociación Nacional de Productores de Harina.

Even so, there appears to be considerable uncertainty about what the supply and demand for wheat has been. Part of the uncertainty stems from the preference of some agencies to provide data for calendar years while other agencies base their data on crop years.

The domestic production of wheat appears to have increased from nearly 22,000 MT in 1950 to slightly over 40,000 MT in 1966, or approximately 7 per cent per year on the average. Apparent consumption, on the other hand, increased from about 24,000 MT to over 104,000 MT during the same period with an average annual rate of increase of 4.7 per cent. Production and consumption data for wheat during the 1950-1967 period are presented in Table 5.5.

Wheat imports have usually accounted for over 60 per cent of apparent consumption during the 1960's. In 1958 the Asociación Nacional de Productores de Harina initiated a program to promote the production of wheat in Guatemala. The program is being carried out in cooperation with the Gremial Nacional de Trigueros (National Wheat Growers Association) and the Oficina de Control de la Importación de Trigo. The goal is to assure that at least 30 per cent of the wheat used in Guatemala is produced domestically. A guaranteed price to producers of Q 6.00 per 100 lbs of wheat is the main instrument being used to achieve this goal. To date the program is considered generally to have been successful. It appears likely that domestic production will continue to supply at least 30 per cent of the demand for wheat during the 1970's.

Projections of the domestic production of wheat during the 1970-1980 period are presented in Table 5.6 and illustrated in Figure 5.3. The projections based on the trend of the production data during the

TABLE 5.5
 PRODUCTION, IMPORTATION AND EXPORTATION OF WHEAT
 (Thousands of Metric Tons)

Year	Production	Imports	Apparent Consumption
1950	21.9	2.0	23.9
1951	26.3	3.4	29.7
1952	22.3	2.9	25.2
1953	19.8	5.2	25.0
1954	18.4	8.1	26.5
1955	14.6	17.3	31.9
1956	18.3	25.7	44.0
1957	18.4	35.3	53.7
1958	21.5	43.4	64.9
1959	21.5	47.7	69.2
1960	21.2	59.1	80.3
1961	24.6	53.9	78.5
1962	25.8	51.2	77.0
1963	34.1	64.2	98.3
1964	36.1	54.5	90.6
1965	39.4	65.7	105.1
1966	40.1	64.4	104.5
1967	35.3	59.6	94.9

Source: Banco de Guatemala

TABLE 5.6
 SUPPLY AND DEMAND PROJECTIONS FOR WHEAT
 (Thousands of Metric Tons)

Year	Supply				Demand			Deficit ^c
	Trend ^a (1)	Trend ^b (2)	BMI (3)	BC (4)	Trend ^c (5)	BMI (6)	CNP (7)	(6)-(2)= (8)
1970	38.4	46.3	34.0	43.8	130.0	117.0	--	70.7
1972	40.6	50.6	36.4	50.0	141.5	127.4	114.9	76.8
1975	44.0	57.1	40.0	61.0	159.0	143.0	128.8	85.9
1980	49.6	67.8	47.0	84.9	187.9	177.0	155.9	109.2

Notation: BMI = Battelle Memorial Institute

BC = Banco de Guatemala

CNP = Consejo Nacional de Planificación

Notes:

^aLeast squares trend line for production based on 1950 to 1966 data is $Q = 24.96 + 1.12T$ where quantity (Q) is in 1000 MT and time (T) is in annual units with 1958 = 0.

^bLeast-squares trend line for production based on 1955 to 1967 data is $Q = 27.0 + 2.15T$ where Q is in 1000 MT and T is in annual units with 1961 = 0.

^cLeast-squares trend line for consumption based on 1950 to 1966 data is $Q = 60.49 + 5.79T$ where Q is in 1000 MT and T is in annual units with 1958 = 0.

^dObtained from BMI data using linear interpolation.

^eDeficit figures are based on 1955-1966 production trend and BMI consumption projections.

Figure 5.3: Wheat Production and Projections

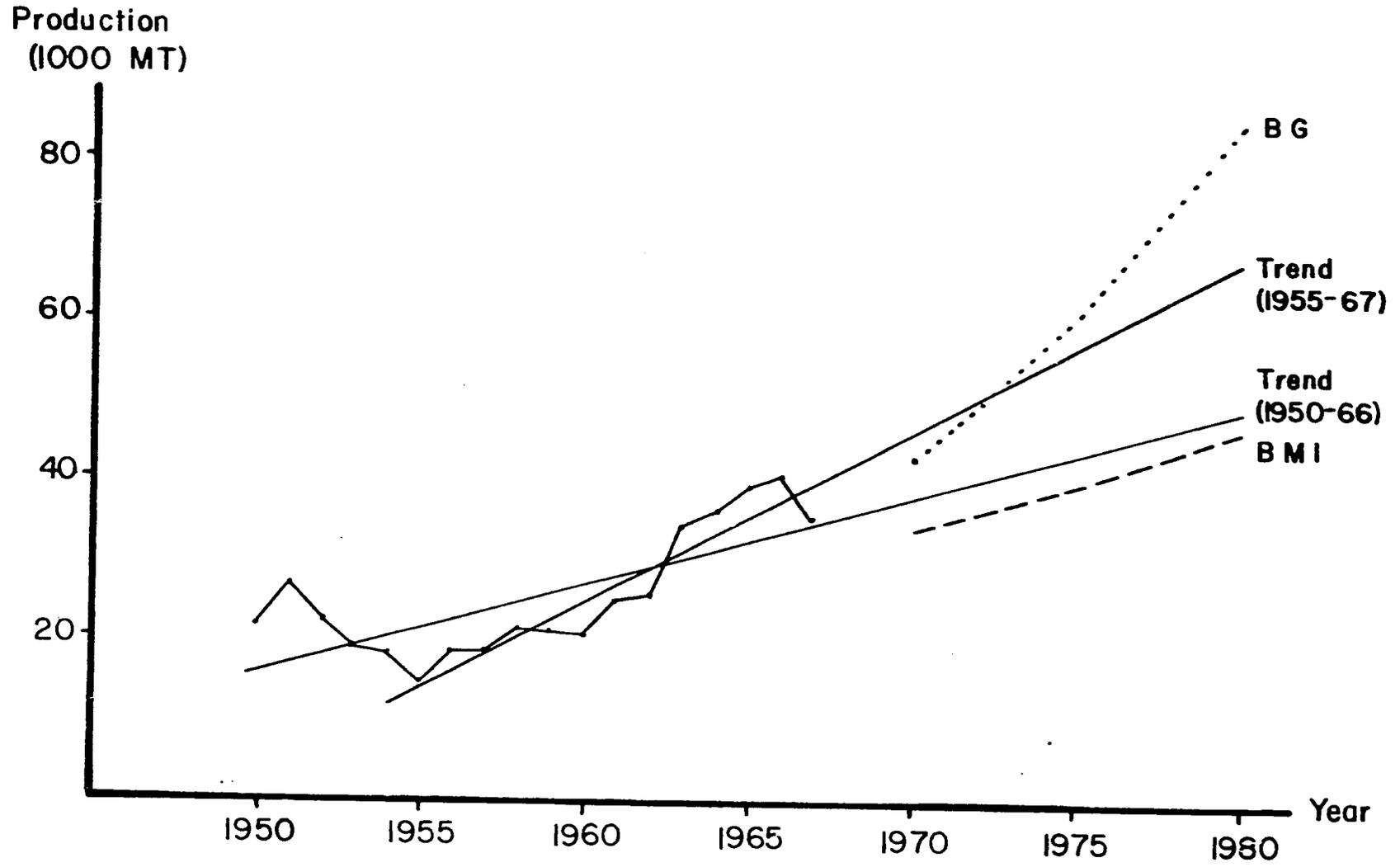
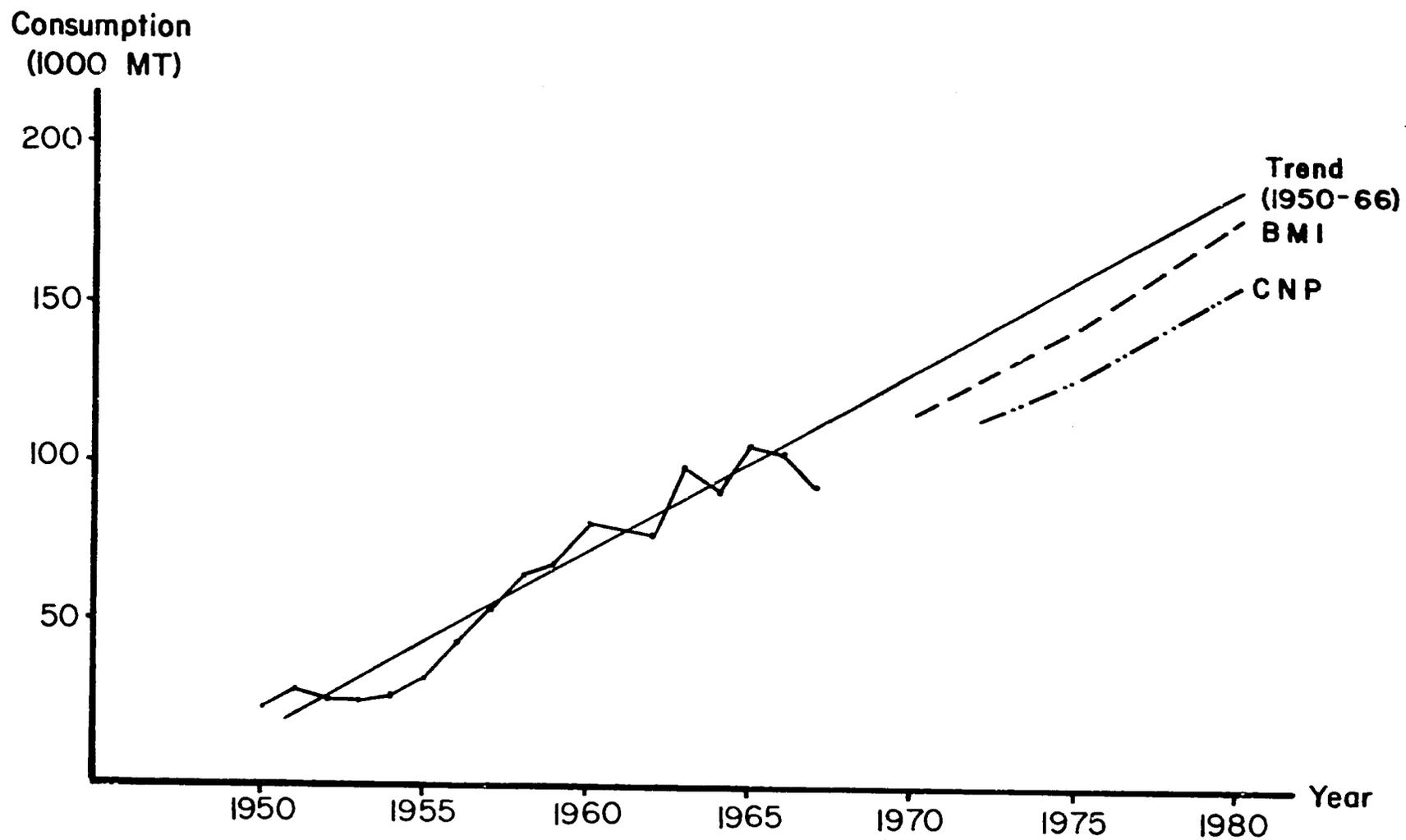


Figure 5.4: Wheat Consumption and Projections



1950-1966 period appear to be somewhat low. The BMI projections are even lower. The production projections based on the trend of production during the 1955 to 1967 period appear to be the most realistic. According to this trend line, the production of wheat will increase from about 46,000 MT in 1970 to nearly 68,000 MT in 1980. These projections are slightly above those of the Banco de Guatemala for 1970 but considerably below the bank's projections for 1980.

Demand projections for wheat are also presented in Table 5.6 and are illustrated in Figure 5.4. The projections of the Battelle Memorial Institute (BMI) lie between those prepared by the Consejo Nacional de Planificación (CNP) and those based on the linear trend in apparent consumption. The BMI projections indicated that the demand for wheat will increase from 117,000 MT in 1970 to 177,000 MT in 1980. These projections were used to estimate the amount of wheat that will be imported during the 1970's.

Subtracting the projections of supply based on the 1955-1967 trend line from the BMI projections of demand we find that wheat imports will increase from about 71,000 MT in 1970 to over 109,000 MT in 1980. This amounts to an average rate of increase in imports of about 5.3 per cent per year compared to an average rate of increase in domestic production of about 4.8 per cent per year during the 1970 to 1980 period.

5.2.4 Rice

Data on the production and apparent consumption of paddy rice are presented in Table 5.7. Rice production increased from less than 9,000 MT in 1950 to nearly 31,000 MT in 1966. Consumption appears to have been approximately equal to production through the period.

TABLE 5.7
 PRODUCTION, IMPORTATION AND EXPORTATION OF ROUGH RICE
 (Thousands of Metric Tons)

Year	Production	Imports	Exports	Apparent Consumption
1950	8.6	--	--	8.6
1951	11.3	0.1	--	11.4
1952	9.9	--	--	9.9
1953	10.8	--	--	10.8
1954	9.7	0.1	--	9.8
1955	9.1	0.4	--	9.5
1956	10.3	0.2	--	10.5
1957	11.2	0.4	--	11.6
1958	11.7	0.3	--	12.0
1959	14.6	0.1	--	14.7
1960	13.6	--	--	13.6
1961	12.6	--	0.3	12.3
1962	15.8	--	--	15.8
1963	18.2	0.1	0.1	18.2
1964	24.3	--	0.1	24.2
1965	28.2	0.1	--	28.3
1966	30.8	--	--	30.8
1967	22.7	0.3	--	23.0

Source: Banco de Guatemala

Imports and exports of rice appear to have been very small. Some imports and exports of rice between Guatemala and other Central American countries are not included in Table 5.7, however. Imports of parboiled milled rice are expected to be eliminated in the future because such rice is now being produced domestically.

There seems to be general agreement that the production of rice will increase from about 28,000 MT of paddy rice in 1970 to around 40,000 MT in 1980. (See Table 5.8.) The demand projections of the Battelle Memorial Institute indicate a surplus production of about 10,000 MT by 1980 while the projections of the Consejo Nacional de Planificación suggest that the surplus of rice will be somewhat less than 3,000 MT. Thus it appears that Guatemala will be a net exporter of rice throughout the 1970's.

5.3 Fruits

The climate in Guatemala is favorable for the production of a wide variety of fruit. Wild varieties of avocados, oranges and mangos, for example, are frequently grown by people around their homes. There has been little interest among farmers in commercial fruit production. There are a few commercial plantings of pears, citrus fruits, apples and pineapples, however.

Vorhies found that there appears to be a need for substantial increase in both the quantity and quality of fruit production in Guatemala.³ His conclusions were based on increased interest in fruit for both

³R. M. Vorhies, Fruit Production in Guatemala, USAID Report, Guatemala, July, 1967.

TABLE 5.8
 SUPPLY AND DEMAND PROJECTIONS FOR ROUGH RICE
 (Thousands of Metric Tons)

Year	Supply			Demand	
	Trend ^a	BMI	BG	CNP	BMI
1970	28.4	27.0	27.9	--	20.0
1972	30.7	30.2 ^b	31.8	27.7	21.8 ^b
1975	34.1	35.0	37.2	30.9	24.6
1980	39.8	41.0	51.6	37.2	30.7

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

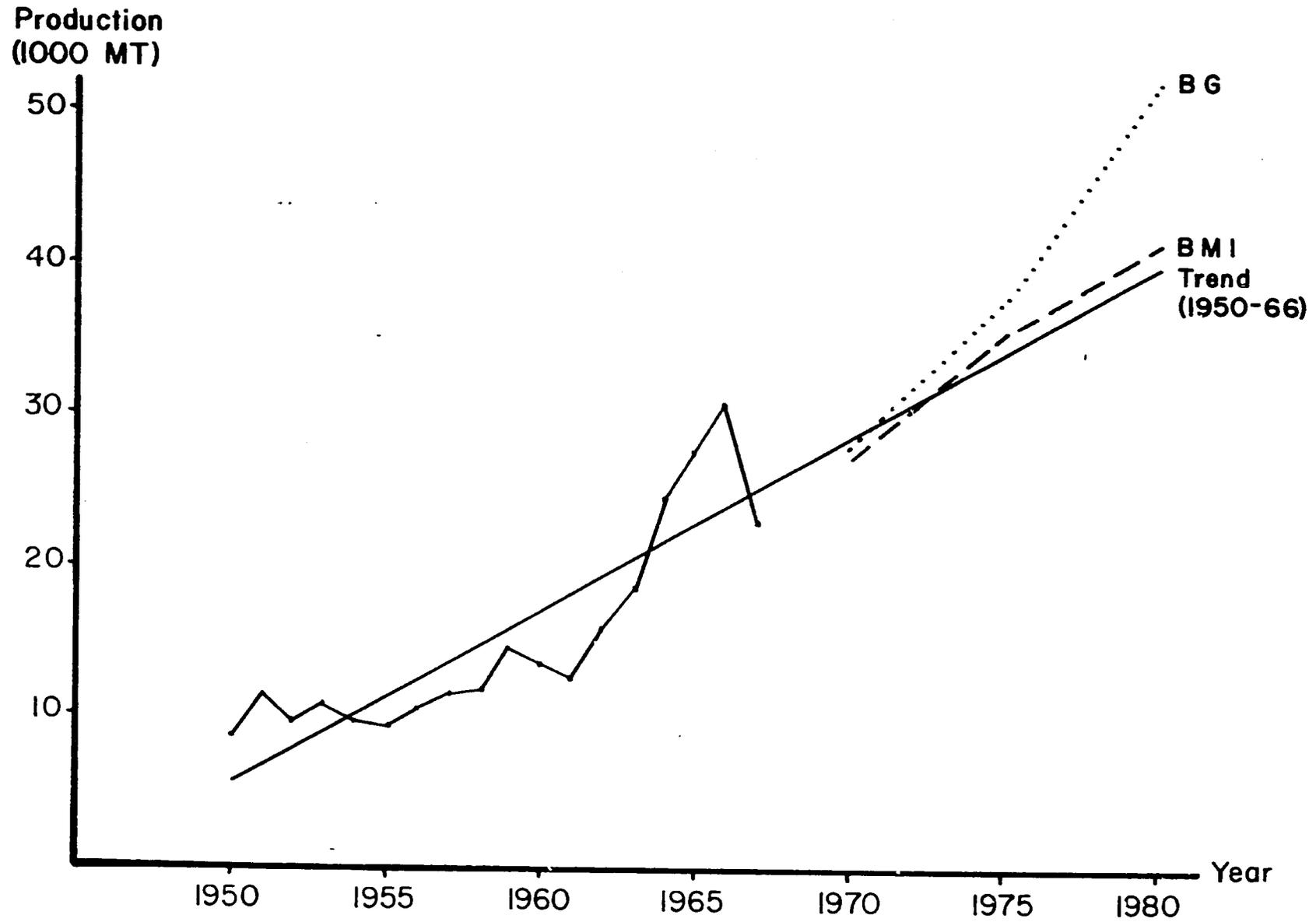
CNP = Consejo Nacional de Planificación

Notes:

^aLeast-squares trend line for production is $Q = 14.75 + 1.14 T$ where Q is in 1000 MT of rough rice and T is in annual units with 1958=0.

^bObtained from BMI data using linear interpolation.

Figure 5.5: Paddy Rice Production and Projections



export and local processing and the fact that local canneries import substantial quantities of fruit pulp to manufacture fruit juice. His observations are substantiated by INCAP's study of food needs in Guatemala. According to INCAP, fruit production in 1965 was only about 60 per cent of the amount required to provide Guatemalans with the minimum requirements of an adequate diet.

There is almost no numerical data on the production of fruits in Guatemala before 1965. INCAP estimated that fruit production in 1965 was 100,423 MT. Their projections of fruit production during the 1970's are as follows:

Year	Production (MT)
1970	119,271
1975	141,656
1980	168,244

Given the existing data situation, these estimates must be considered to be their best guess.

Estimates of fruit production prepared by the Dirección General de Mercadeo Agropecuario for the 1965-1967 period are presented in Table 5.9. Their estimates are slightly higher than those of INCAP.

Comparing INCAP's estimates with the demand estimates in Table 5.10 which were prepared by the Consejo Nacional de Planificación we find that demand is expected to exceed supply by about 12,000 MT in 1975 and by 19,000 MT in 1980. These projections are based on the assumption that proposed programs for increasing fruit production will not be implemented soon enough to substantially affect the production of fruit in Guatemala during the 1970's.

TABLE 5.9
FRUIT PRODUCTION
(Thousands of Metric Tons)

Fruit	1965-1966	1966-1967	1967-1968
Citrus	42.9	53.3	56.1
Coconuts	18.7	19.8	19.6
Avocado	14.8	16.4	15.8
Mango	9.2	8.8	9.3
Pineapple	8.9	9.2	10.0
Apples	3.4	3.6	3.3
Peaches	2.0	2.0	1.6
Pears	1.5	1.6	1.3
Others	20.9	21.5	19.1
TOTAL	122.3	136.2	136.1

Source: Dirección General de Mercadeo Agropecuario

TABLE 5.10
PROJECTED DEMAND FOR FRUITS
(Thousands of Metric Tons)

Product	1972	1975	1980
Oranges	77.8	87.6	106.6
Pineapple	10.6	11.8	14.1
Apples	4.2	4.7	5.6
Others	45.7	50.9	60.8
TOTAL	138.3	155.0	187.1

Source: Consejo Nacional de Planificación

5.4 Vegetables

The variations in climate and topography in Guatemala permit the production of almost any type of vegetable. It has been estimated that at least 30 different types of vegetables are grown on a commercial scale in Guatemala at the present time. Data on the production of vegetables in Guatemala is almost nonexistent, however. Thus any projections of demand and supply must be used with considerable caution. There appears to be general agreement that the production of vegetables has been increasing fairly rapidly since about 1960. Domestic consumption has apparently increased somewhat during this period. Exports of vegetables, primarily to El Salvador, reportedly have increased substantially.

Atlee estimated that the value of vegetable production in 1966 was approximately 16 million quetzales while the value of exports was around 1.5 million quetzales.⁴ His production estimates indicate that onion, tomatoes, potatoes, garlic, peppers, cabbage and melons are the most important vegetables produced.

The projections of demand for vegetables made by the Battelle Memorial Institute (BMI), the Consejo Nacional de Planificación (CNP) and the Instituto de Nutrición de Centro America y Panama (INCAP) are presented in Table 5.11. Considering the lack of data, it is not surprising that there are substantial differences in these projections. INCAP's projections represent approximately 50 per cent of the amount

⁴Charles B. Atlee, Jr., Producción de Hortalizas en Guatemala, USAID Report, Guatemala, January, 1968.

TABLE 5.11
PROJECTED DEMAND FOR VEGETABLES
(Thousands of Metric Tons)

	BMI			CNP			INCAP ^a		
	1970	1975	1980	1972	1975	1980	1970	1975	1980
Potatoes	12	16	19	12	13	16	--	--	--
Vegetables	250	301	366	105	117	140	198.7	235.9	280.3
a. Tomatoes	--	--	--	17	19	23	--	--	--
b. Cabbage	--	--	--	10	11	13	--	--	--
c. Garlic	--	--	--	2	2	2	--	--	--
d. Onion	--	--	--	12	14	17	--	--	--
e. Others	--	--	--	64	71	85	--	--	--

Source: Battelle Memorial Institute (BMI)

Concejo Nacional de Planificación (CNP)

Instituto de Nutrición de Centro America y Panama (INCAP)

Notes:

^aINCAP figures are designated as "apparent consumption or annual production." Thus, in the case of vegetables, INCAP's projections represent both supply and demand. INCAP lists the original source of their data as, "Anuario Estadístico Centroamericano de Comercio Exterior, 1965, SIECA.

of vegetables which it considers necessary to provide Guatemalans with an adequately balanced diet. The BMI projections appear to be rather high while the CNP projections appear somewhat conservative.

According to the CNP projections the domestic demand for vegetables will increase from about 105,000 MT in 1972 to around 140,000 MT in 1980. INCAP, on the other hand, projects an 80,000 MT increase in demand during the 1970 to 1980 period. We are inclined to use the CNP projections for planning purposes.

Supply projections based on the linear trend of data provided by the Banco de Guatemala are presented in Table 5.12. According to these projections, vegetable production will increase from over 146,000 MT in 1970 to about 180,000 MT in 1980. Production of potatoes is expected to increase from 22,000 MT to 30,000 MT during the same period.

Comparing the bank's supply projections with the CNP demand projections, we find that the exportable surplus of vegetables decreases slightly from 58,000 MT in 1972 to around 40,000 MT in 1980.

5.5 Livestock

The number of hogs, cattle and chickens have increased rather rapidly since the early 1960's while sheep numbers have continued to decline. It seems doubtful that hogs and chickens will continue to increase as rapidly in the 1970's as they have in the 1960's. Cattle raising is expected to continue to expand, however, as new pasture areas are opened up by the road development program. Sheep are raised primarily by small farmers; frequently on government or communal lands. The native sheep are small and produce only about a pound of low

TABLE 5.12
 SUPPLY OF VEGETABLES
 (Thousands of Metric Tons)

Year	Vegetable Production ^a	Potatoe Production ^b	Net Exports of Potatoes
1950	80.7	8.8	--
1951	82.9	9.4	--
1952	86.3	9.8	--
1953	89.0	10.3	--
1954	92.7	9.7	--
1955	96.2	8.3	--
1956	98.2	10.1	--
1957	102.0	13.2	--
1958	105.6	13.5	--
1959	110.2	13.4	--
1960	113.9	12.9	--
1961	119.1	14.2	2.5
1962	118.2	16.6	3.5
1963	122.1	14.3	4.1
1964	125.8	17.5	6.7
1965	129.7	20.7	9.7
1966	133.8	23.2	--
1967	--	14.2	--
		<u>Projections</u>	
1970	146.4	22.4	
1972	153.1	23.9	
1975	163.1	26.2	
1980	179.9	30.0	

Source: Banco de Guatemala

^aProjections for 1970-1980 are based on the least-squares trend line for 1950-1966, $Q = 106.20 + 3.35 T$ where Q is in 1000 MT and T is in annual units with 1958 = 0.

^bProjections for potatoes are based on the least-squares trend line for 1950-1966, $Q = 13.29 + 0.76 T$ where Q is in 1000 MT and T is in annual units with 1958 = 0.

quality wool per shearing. It seems likely that the number of sheep in Guatemala will continue to decline during the 1970's. Official estimates of livestock numbers are presented in Table 5.13.

5.5.1 Cattle

According to the Dirección General de Estadística, cattle numbers increased from a low of about 992,700 head in 1955 to around 1,383,600 head in 1965 and then declined to 1,241,600 head in 1967. The trend in cattle numbers is illustrated in Figure 5.6. Unofficial estimates suggest that the actual number of cattle in Guatemala exceed the official estimates of the DGE by about 10 per cent. The number of cattle shown in Table 5.13 includes both beef and dairy cattle.⁵

Over 50 per cent of the cattle in Guatemala are raised in the five departments on the South Coast.⁶ Cattle production in the North Coast area has been expanding in recent years, however, as new roads have opened up new pasture lands. The annual rainfall on the South Coast averages from 2,000 to 3,500 millimeters, most of which comes during late April to late October. Feed is very short during the dry season. The extremely heavy rainfall from May to October makes it impossible to cure roughages for supplemental feed for the November through April period. As a result, cattle frequently lose weight during this period and the size of the annual calf crop is reduced. The

⁵Total number of dairy cattle in 1962, for example, was 212,879.

⁶These are Escuintla, Jutiapa, Santa Rosa, Suchitepequez, and Retalhuleu.

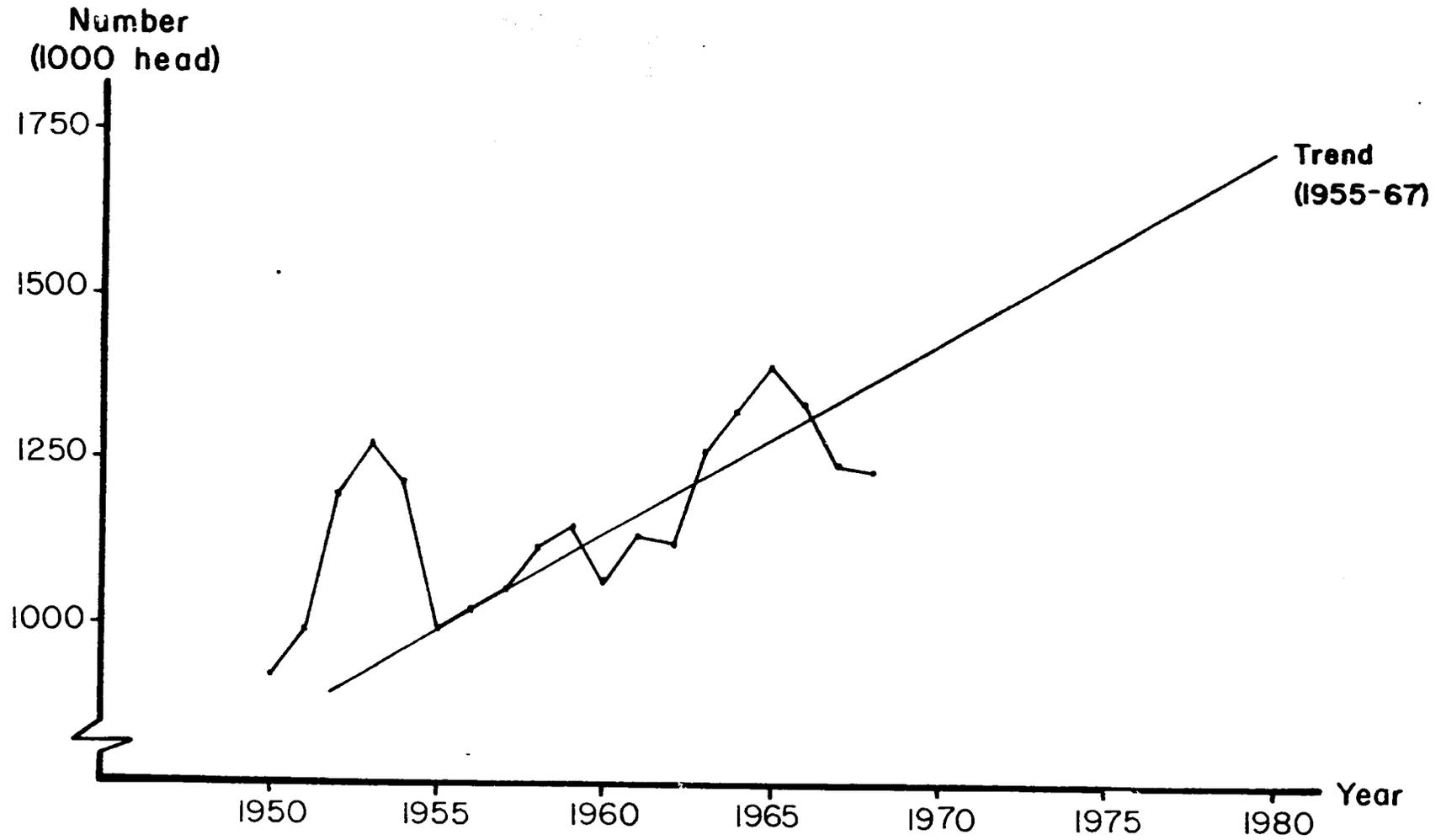
TABLE 5.13
LIVESTOCK NUMBERS
(Thousand Head)

Year	Cattle	Hogs	Sheep	Chickens	Goats
1950	919.1	424.2	715.6	4,259.6	78.8
1951	979.4	391.5	--	--	--
1952	1,194.1	414.7	888.5	--	76.6
1953	1,270.3	462.0	812.9	4,654.5	134.2
1954	1,217.8	434.6	868.2	4,259.4	90.7
1955	992.7	390.4	739.3	4,116.1	86.4
1956	1,016.6	361.8	756.2	4,258.7	77.7
1957	1,048.8	401.4	826.2	4,745.9	84.4
1958	1,113.0	403.4	839.5	4,706.9	87.8
1959	1,142.3	406.3	791.6	4,774.8	89.1
1960	1,062.0	--	840.9	4,772.5	92.6
1961	1,134.4	409.3	676.5	4,819.0	88.6
1962	1,121.9	387.9	792.2	4,514.8	85.9
1963	1,263.3	381.0	702.3	5,350.5	89.3
1964	1,323.8	381.0	681.0	--	--
1965	1,383.6	473.9	794.1	6,350.9	--
1966	1,327.6	542.9	526.0	5,945.5	--
1967	1,241.6	594.1	631.6	6,113.4	--
1968 ^a	1,230.4	639.2	681.9	5,494.4	--

Source: Dirección General de Estadística

Notes: ^aAll 1968 figures are preliminary.

Figure 5.6: Cattle Numbers



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problem of providing adequate feed for cattle throughout the dry season has been cited as the most critical factor facing the cattle industry.⁷ Nolan outlined a research program directed to the solution of this problem in 1965 but due to the Ministry of Agriculture's shortage of personnel and funds very little is presently being done in this area.⁸ It seems unlikely that the type of program outlined by Nolan will be undertaken in Guatemala within the next five years.

It may be possible to initiate a regional research program within a shorter period of time. A regional research program could perhaps more nearly insure the continuity and personnel required for a live-stock research program.

There is considerable uncertainty about the future development of the cattle industry in Guatemala. Projections made by the Banco de Guatemala suggest that beef production will increase from around 46,500 metric tons in 1970 to nearly 84,000 metric tons in 1980. Projections based on the past trend indicate production will increase from 31,800 MT to 45,400 MT during the same period. The key factor in the future development of the cattle industry appears to be the ability of exporters to obtain favorable prices for beef in the world market. There is little doubt but that the cattle producers can and will be able to solve their production problems provided they can obtain favorable prices. Assuming that prices will remain as favorable as

⁷Vard M. Shepard, The Livestock Development of Guatemala, USAID Report, Guatemala, August, 1967.

⁸Paul R. Noland, Problems in the Animal Nutrition Program, USAID Report, Guatemala, Guatemala, September, 1967.

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they have been in recent years, the projections of beef production made by the Battelle Memorial Institute (BMI) appear to be the most realistic projections presently available. (See Table 5.14.) According to the BMI projections, beef production is expected to increase from 42,200 MT in 1970 to 64,100 MT by 1980.

The BMI projects the domestic demand for beef to be 53,000 MT in 1970 increasing to 82,000 MT in 1980. These projections seem rather high. Projections prepared by the Consejo Nacional de Planificación suggest that the demand for beef will increase from about 30,400 MT in 1972 to around 42,100 MT in 1980. We have used the Consejo's demand projections and the BMI supply projections to estimate the exportable beef production during the 1970's. The results presented in Table 5.14 indicate that the amount of meat available for export will increase from 15,300 MT in 1970 to 22,000 MT in 1980.

The assumption that exporters will be able to obtain favorable prices in the world market is, at the present time, equivalent to an assumption that exporters will be able to continue to export substantial amounts of beef to the United States. Of the 4,764 MT of beef exported in 1964, for example, about 83 per cent was shipped to the United States while most of the remainder went to Puerto Rico. Thus any import restrictions on beef entering the United States would undoubtedly slow the growth of the cattle industry in Guatemala and invalidate our projections of production and exportable surplus.

5.5.2 Hogs

According to the estimates of the Dirección General de Estadística (DGE), the number of hogs in Guatemala increased from 424,200 in 1950

TABLE 5.14
BEEF PRODUCTION

Year	Inventory (1000 head)		Slaughter Numbers (1000 head)			Edible Beef per Animal ^b (Kg.)	Edible Beef Production (1000 MT)		
	Trend ^c	BMI	Trend	BMI ^a	BG		Trend	BMI	BG ^e
1970	1,429	1,898	200.0	265.7	292.7	159	31.8	42.2	46.5
1972 ^d	1,487	1,879	215.6	285.4	327.0	160	34.5	45.7	52.3
1975	1,575	2,100	236.2	315.0	386.0	162	38.3	51.0	62.5
1980	1,721	2,430	275.4	388.0	509.4	165	45.4	64.1	84.0

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

Notes: ^aBMI estimated based on assumption that 14 per cent of inventory is slaughtered in 1970, 15 per cent in 1975 and 16 per cent in 1980.

^bBased on BMI estimates.

^cLeast-squares trend line for the 1955-1967 period is $Q = 1,166.0 + 29.2T$ where Q is in 1,000 head and T is in annual units with 1961 = 0.

^dBMI figures for 1972 are obtained by linear interpolation.

^eFigures obtained from Banco de Guatemala projections for total production of cattle by subtracting 10 per cent assumed to represent increases in livestock inventory.

TABLE 5.15
DEMAND AND EXPORTABLE SUPPLY OF BEEF
(Thousands of Metric Tons)

Year	Demand		Exportable Surplus
	BMI	CNP	
1970	53.0	--	--
1972	57.8	30.4	15.3
1975	65.0	34.4	16.6
1980	82.0	42.1	22.0

TABLE 5.16
EXPORT AND IMPORTS OF MEAT
(Metric Tons)

Year	Chickens (Live)		Beef (Live)		Pork (Live)		Processed Meat ^a	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
1959	111.8	2.6	3,042	388	7.0	124.8	291.2	7.0
1960	140.1	6.0	2,777	249	1.2	148.0	194.0	542.9
1961	46.2	5.5	3,200	305	8.9	211.7	213.9	1,114.4
1962	10.3	4.3	2,789	5	3.7	85.3	160.6	4,919.2
1963	26.0	10.6	11,445	159	237.5	170.7	241.5	6,043.6
1964	35.5	24.3	8,121	215	201.4	84.2	140.6	4,764.6
1965	92.9	41.8	6,844	96	721.2	61.8	290.1	5,811.5
1966	132.5	18.1	10,192	50	697.7	76.1	--	5,924.7
1967	--	23.7	--	82	--	65.3	--	8,780.4
1968	--	--	--	--	--	--	--	--

Source: Dirección General de Estadística

Notes:

^aImports of processed meats are largely canned and prepared meats. Exports of processed meats are entirely refrigerated and frozen fresh meat.

to 594,100 in 1967. (See Table 5.13.) The centers of heaviest hog population are the departments of Jutiapa, Alta Verapas, Huehuetenango, Quiché and San Marcos.

Guatemala consumes more pork than it produces. The importation of live hogs has been especially high since 1963. (See Table 5.16.) This is reflected in the rapid increase in hog numbers reported by the DGE beginning in 1964. (See Figure 5.7.) The rapid expansion of the hog industry at the present time is at least partly due to the high price of pork. The farm price of fat hogs is usually about double that of beef cattle. The average live weight price of hogs in 1967, for example, was between 23 and 24 cents a pound as compared to 12 to 14 cents live weight for cattle. Thus, with a good management, feed and disease control program pork production should be quite profitable in Guatemala at the present time.

The projections of hog production based on the past trend in hog numbers indicate that the production of pork will increase from about 15,900 MT in 1970 to 18,200 MT in 1980. These projections are somewhat higher than those of the Battelle Memorial Institute. (See Table 5.17.) The projections which were prepared by the Banco de Guatemala suggest that pork production will be at least twice as great as indicated by the projections based on past trends, however.

The Battelle Memorial Institute projects the demand for pork to increase from about 15,000 Mt in 1970 to 21,000 MT in 1980. Using these estimates and the projections of production based on past trends, we find the deficit in pork production increasing from 900 MT in 1970 to 2,800 MT at the end of the decade. (See Table 5.18.) Using the CNP's projections of demand and past production trends, the deficit

Figure 5.7: Hog Numbers

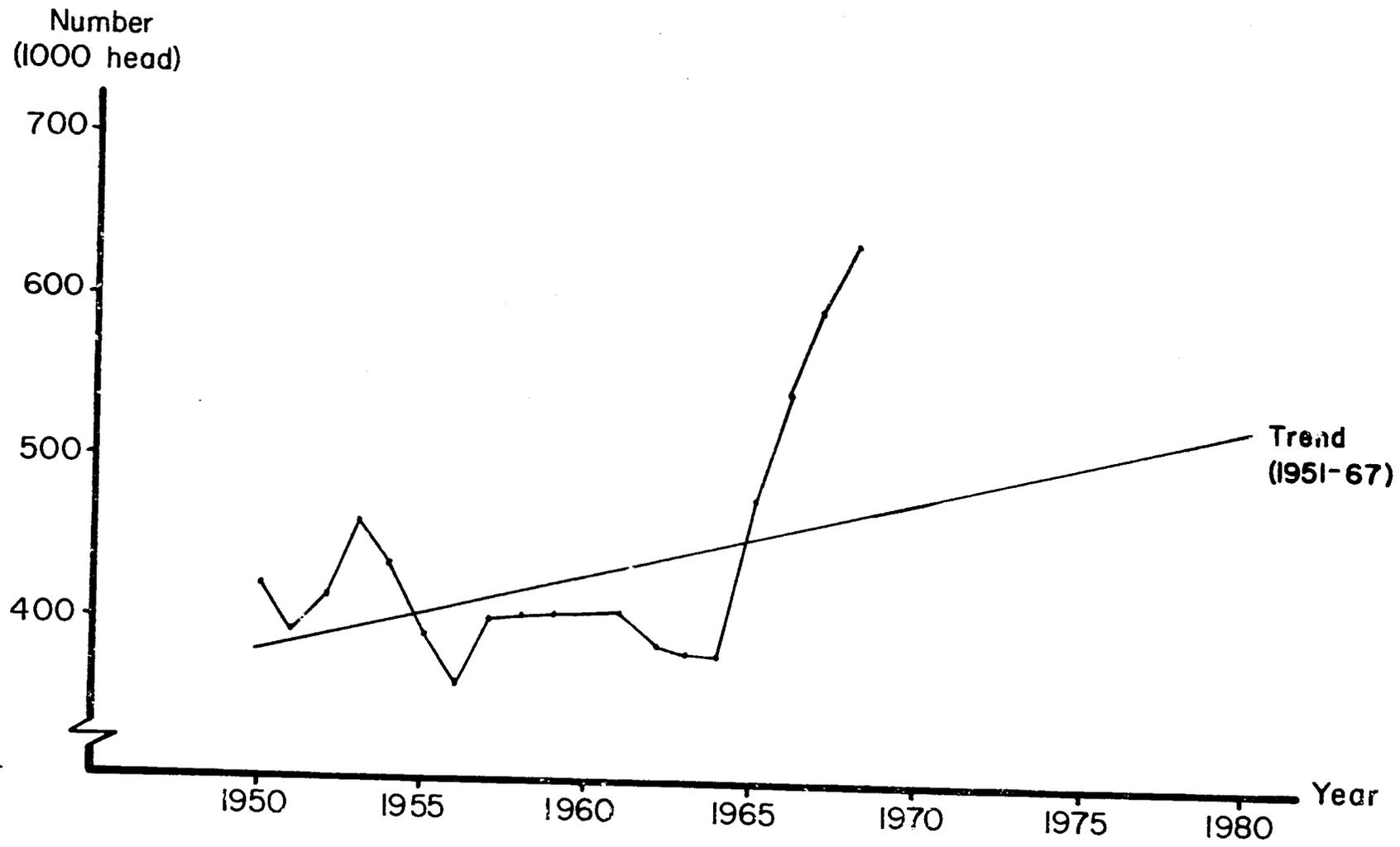


TABLE 5.17
PORK PRODUCTION

Year	Inventory (1000 head)		Slaughter Numbers ^a (1000 head)		Edible Pork per Animal (Kg.)	Edible Pork Production (1000 MT)	
	Trend ^b	BMI	Trend	BMI		Trend	BMI
1970	480.0	425.6	302.4	268.1	52.6	15.9	14.1
1972 ^c	489.8	432.0	308.6	272.1	53.0	16.3	14.4
1975	504.5	441.5	317.8	278.1	53.7	17.1	14.9
1980	529.0	465.9	333.3	293.5	54.7	18.2	16.0

Notes:

^aBased on the assumption that 63 per cent of inventory is slaughtered each year.

^bThe least-squares trend line for the 1951-1967 period is $Q = 426.1 + 4.9 T$ where Q is in 1,000 head and T is annual units with 1959 = 0.

^cBMI figures for 1972 obtained by linear interpolation.

TABLE 5.18
DEMAND FOR PORK
(Thousands of Metric Tons)

Year	Demand		Deficit Production	
	BMI	CNP	(a)	(b)
1970	15.0	-	0.9	--
1972	16.2	22.4	(0.1)	6.1
1975	18.0	25.0	0.9	7.9
1980	21.0	30.0	2.8	11.8

Notation: BMI = Battelle Memorial Institute

CNP = Consejo Nacional de Planificación

Notes:

^aDeficit production based on trend of production and BMI estimates of demand.

^bDeficit production based on trend of production and CNP estimates of demand.

of pork production in 1980 is about 11,800 MT. This figure appears to be somewhat high. Given recent developments in the pork industry, it appears more likely that the amount of pork supplied will be fairly close to the amount demanded in the early 1970's but that the deficit in pork production may tend to increase in the second half of the decade.

5.5.3 Poultry

There was a rapid increase in the production of chickens between 1962 and 1965. (See Figure 5.8.) This increase was almost entirely due to an increase in the broiler population. The production of broilers appears to have fallen off since 1965, however. This is reportedly due to increased disease problems together with lower prices which have decreased the profitability of producing broilers in Guatemala.

The projected number of chickens based on the past trend in chicken population are:

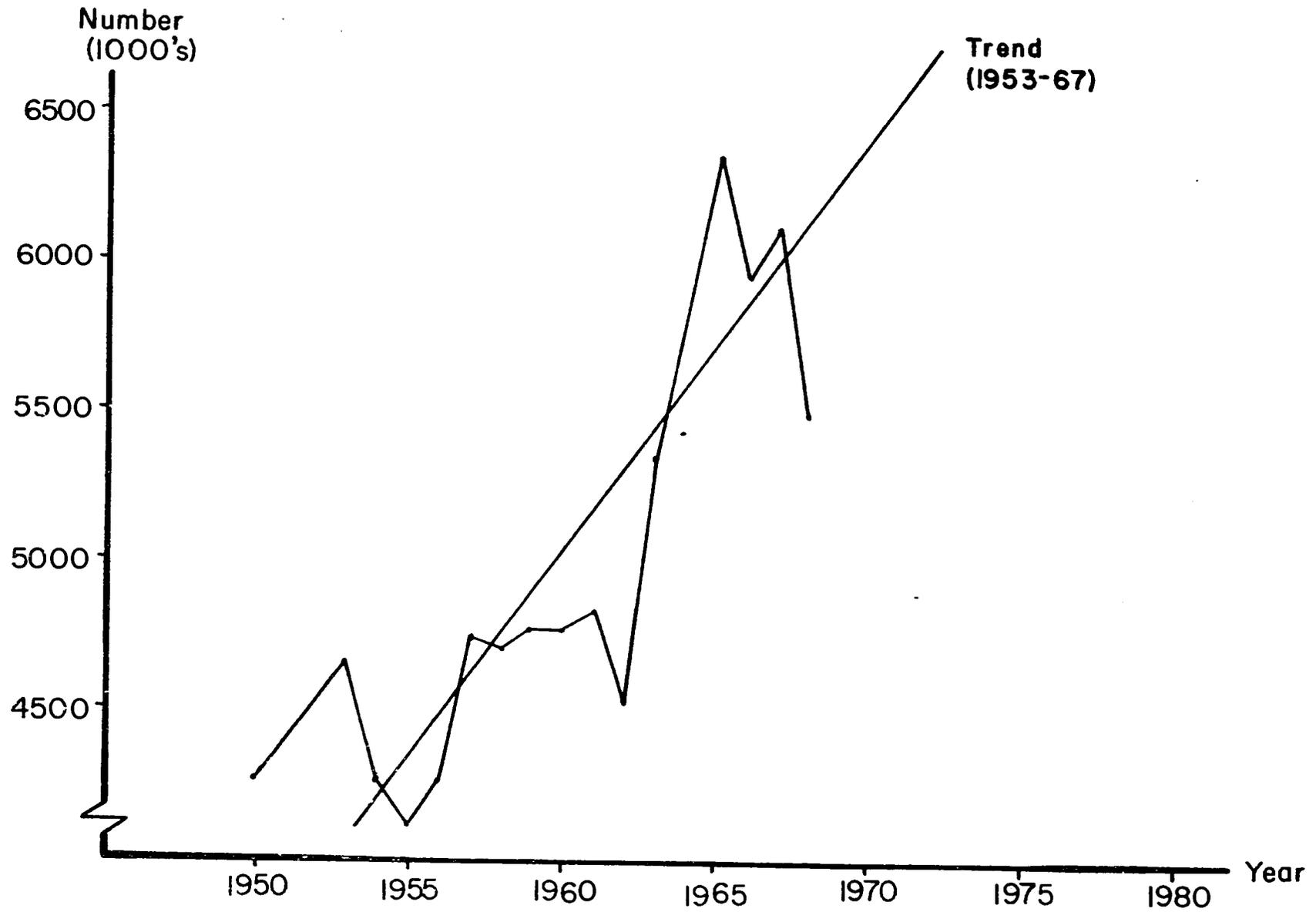
Year	Thousands of Birds ⁹
1970	6,410
1972	6,690
1975	7,109
1980	7,808

These projections may be somewhat high, however, because they are heavily influenced by the rapid increase in chicken numbers between 1963 and 1967. Even so, poultry producers are apparently able to increase the number of birds by at least a half million birds a year if

⁹The least-squares trend line is $Q = 5,012.0 + 139.8 T$ where Q is in 1000's of birds and T is in annual units with 1960 = 0.

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Figure 5.8: Chicken Numbers



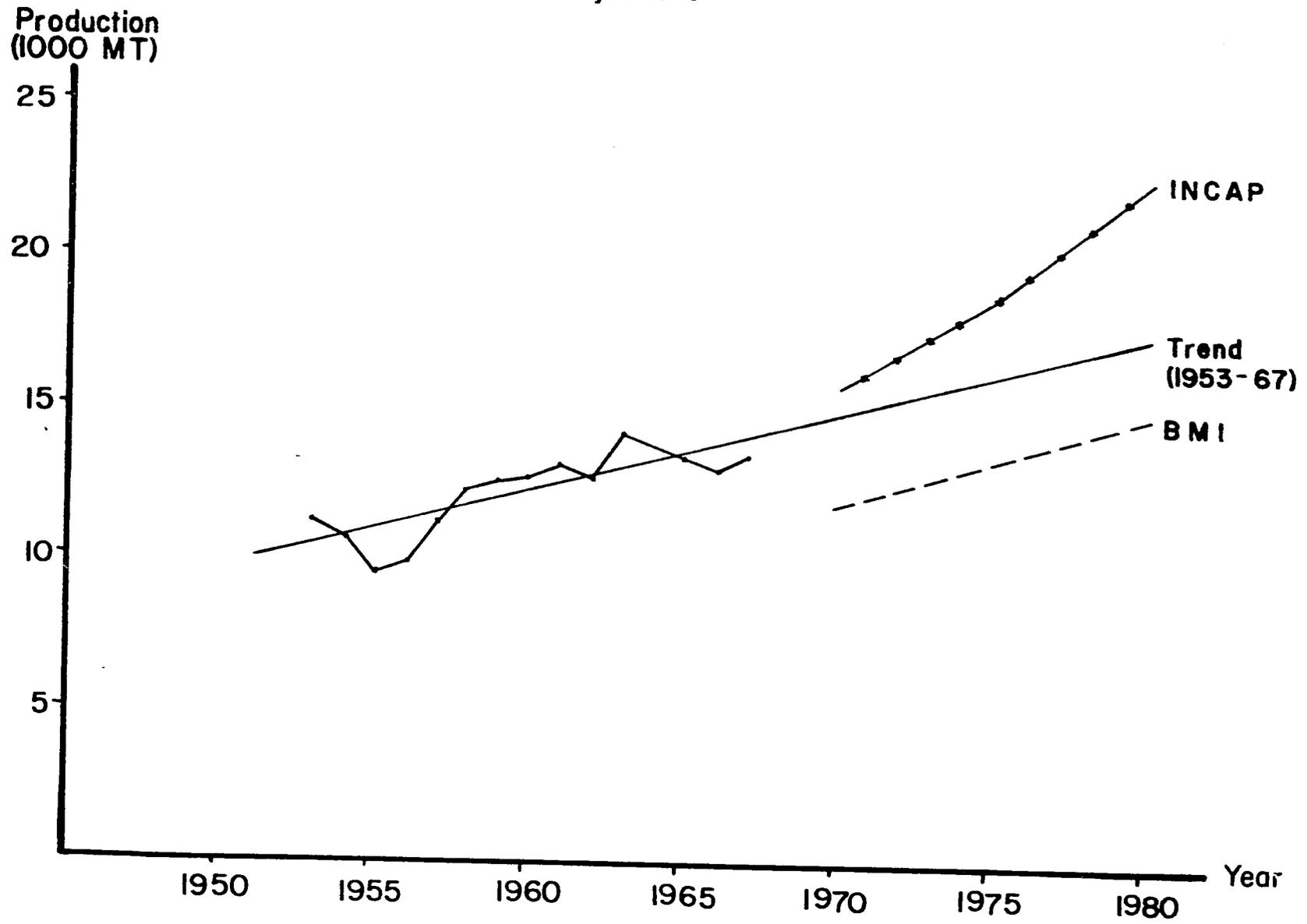
they want. Thus, the projected inventory of 7,808,000 birds by 1980 is certainly feasible.

Egg production has increased rather slowly during the past 10 years as is seen by inspection of Figure 5.9. The total number of hens increased from about 1,907,000 in 1957 to around 2,287,000 in 1967. Egg production, based on an assumed 100 eggs per year per hen, increased from about 191 to 229 million during the same period. (See Table 5.19.) Estimates of egg production vary considerably, however. Available estimates for 1967, for example, range from 250 to 460 million eggs produced.

The export and import figures for eggs suggest that egg production around Guatemala City may have increased much more rapidly in recent years than the trend illustrated in Figure 5.9. According to the Dirección General de Estadística, imports of eggs fell from 893 MT in 1960 to 167 MT in 1966 while exports increased from 3 MT to 307 MT during the same period.

Projections of egg production range from 12,600 to 44,500 MT for 1970 and from 15,000 to 117,700 MT for 1980. (See Table 5.20.) We are inclined to accept INCAP's estimates of production which indicate that there will be about 15,800 MT of eggs produced in 1970 and 22,800 MT in 1980. Comparing INCAP's production projections with the BMI's supply projections, we find 2,800 MT of eggs available for export in 1970 decreasing to 1,800 MT in 1980. The export projections for 1970 seem rather high. It appears more likely that the quantity of eggs demanded will be approximately equal to the quantity supplied during the next 10 years. The net export of eggs may increase somewhat during the next five years but there is no indication that Guatemala will become

Figure 5.9: Egg Production and Projections



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TABLE 5.19
 PRODUCTION OF MILK AND EGGS

Year	Eggs ^b (Million)	Milk (1000 MT)
1950	--	76.9
1951	--	--
1952	--	152.6
1953	191.5	169.5
1954	184.6	97.1
1955	163.6	86.0
1956	168.2	89.5
1957	190.7	90.1
1958	208.5	124.0
1959	212.2	135.0
1960	213.9	90.3
1961	222.3	98.2
1962	217.6	122.2
1963	241.8	150.6
1964	--	161.0
1965	227.7	146.2
1966	220.7	163.7
1967	228.7	190.2
1968 ^a	215.0	--

Source: Dirección General de Estadística

Notes:

^a1968 figures are preliminary.

^bBased on an estimated 100 eggs per year per hen reported to be in production. (1,915,000 hens were reported to be in production in 1953, for example.)

TABLE 5.20
SUPPLY AND DEMAND FOR EGGS
(Thousands of Metric Tons)

Year	Production ^c				Demand	
	Trend ^a	BMI	INCAP	BG	BMI	CNP
1970	15.0	12.0	15.8	44.5	13.0	--
1972 ^b	15.5	12.4	17.0	54.1	14.2	36.8
1975	16.3	13.0	18.7	72.4	16.0	41.9
1980	17.7	15.0	22.8	117.7	21.0	51.9

Notation: BMI = Battelle Memorial Institute
 INCAP = Instituto de Nutrición de Centro America y Panama
 BG = Banco de Guatemala
 CNP = Consejo Nacional de Planificación

Notes:

^aLeast-squares linear trend line based on the 1953-1967 period is $Q = 12.37 + 0.265 T$ where Q is in 1000 MT of eggs and T is in annual units with 1960 = 0.

^bBMI and INCAP figures for 1972 obtained by linear interpolation.

^cConversion to metric tons is on the basis of 1,000,000 eggs = 59.36 MT.

a large exporter of eggs.

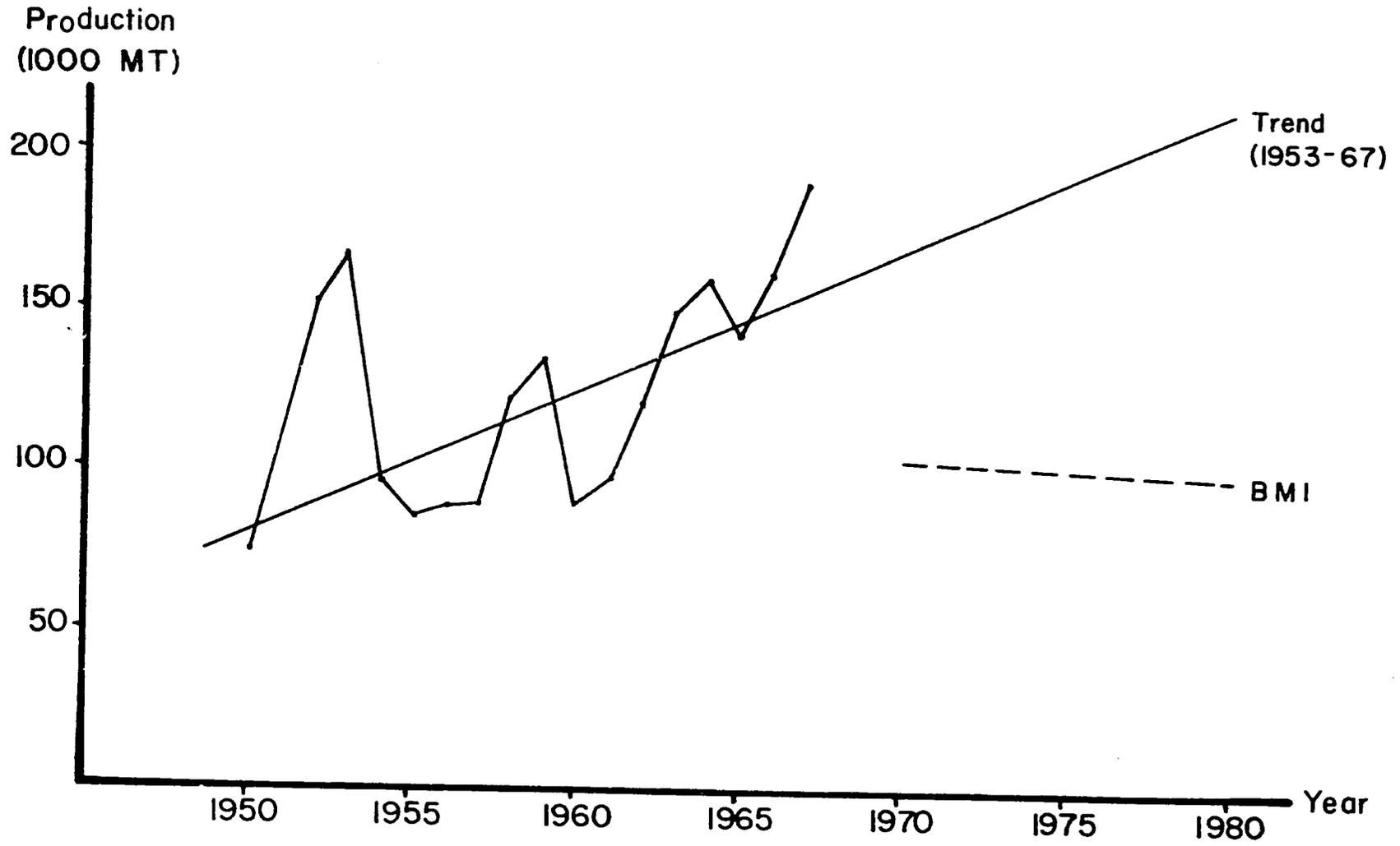
5.5.4 Dairy Products

Milk production appears to have increased fairly rapidly in Guatemala since 1960. (See Figure 5.10.) According to a livestock survey taken in September of 1966 by the Dirección General de Estadística, there were 302,620 milk cows in the country, 211,837 of which were reported to be in production. The average cow at that time was apparently producing about 2.5 liters of milk per day. The survey was taken during the rainy season when pastures were in excellent condition, however. Thus the figures probably tend to overestimate the average percentage of cows in production and the total amount of milk produced.

The CIF value of dairy products imported during the calendar year 1966 amounted to Q 2.42 million. The United States supplied about 22 per cent of the total value of milk imports in 1966. Denmark, Holland and the United Kingdom were the most important source of dairy products especially for dried and powdered milk. Guatemala exports some milk products to other Central American countries. Most of the fresh milk exports go to El Salvador because it is close to the milk producing areas on the South Coast. Data on imports and exports of dairy products are presented in Table 5.21.

Projections of the supply and demand for dairy products vary considerably. (See Table 5.22.) The Battelle Memorial Institute projected milk production to decrease from around 105,000 MT in 1970 to 100,000 MT in 1980. The Banco de Guatemala projects milk production to increase from 258,000 MT in 1970 to over 350,000 MT

Figure 5.10: Milk Production and Projections



h/c

TABLE 5.21
 IMPORTS AND EXPORTS OF MILK PRODUCTS
 (Metric Tons)

Year	Fresh Milk and Cream		Evaporated or Condensed Milk and Dried Milk Products Imports
	Imports	Exports	
1959	9.6	1,830.2	3,545.0
1960	23.4	2,737.2	3,310.9
1961	37.7	2,680.6	2,877.8
1962	3.4	2,060.3	4,066.5
1963	3.8	2,386.1	6,440.2
1964	13.4	2,989.1	5,373.6
1965	12.5	2,049.3	3,477.9
1966	43.1	2,447.6	--
1967	--	2,113.3	--

Source: Dirección General de Estadística

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TABLE 5.22
 SUPPLY AND DEMAND FOR MILK
 (Thousands of Metric Tons)

Year	Production			Demand			Deficit	
	BMI (1)	BG (2)	Trend ^b (3)	BMI (4)	CNP (5)	INCAP (6)	(5)-(3) (7) ^c	(4)-(3) (8) ^d
1970	105.0	258.5	170.3	208.0	--	259.5	--	37.7
1972 ^a	103.8	274.8	179.0	228.4	292.8	--	113.8	49.4
1975	102.0	301.2	192.0	259.0	333.1	331.2	141.1	67.0
1980	100.0	350.7	214.0	327.0	413.2	422.7	199.2	113.0

Notation: BMI = Battelle Memorial Institute

BG = Banco de Guatemala

CNP = Consejo Nacional de Planificación

INCAP = Instituto de Nutrición de Centro America y Panama

Notes:

^aBMI figures for 1972 are based on linear interpolation.

^bLeast-squares trend line for the 1952-1967 period is $Q = 126.6 + 4.37 T$ where Q is in 1000 MT and T is in annual units with 1960 = 0.

^cBased on CNP demand projections and trend in production.

^dBased on BMI demand projections and trend in production.

in 1980. Projections based on the trend of production during the 1953 to 1967 period indicate that milk production will be about 170,000 MT in 1970 and increase to around 214,000 MT by 1980. The projections based on the past trend may be somewhat low, however. There seems to be little doubt but that Guatemala has the potential to produce more milk than indicated by the projections based on the past trend. If the government were to allow the retail price of pasteurized milk to increase by, say, 10 per cent, milk production during the 1970's would probably be at least 6 per cent above the projected trend line provided that a substantial proportion of the benefits from the price increase went to dairy farmers.

The demand for milk is projected by the Battelle Memorial Institute to increase from 208,000 MT a year in 1970 to 327,000 MT by 1980. The Consejo Nacional de Planificación, on the other hand, projects demand to increase from over 292,000 MT in 1972 to over 413,000 MT in 1980. Using the Consejo's projections of demand and the production projections based on the past trend, we find the deficit in milk production increasing from about 113,000 MT in 1972 to over 199,000 MT in 1980. Using the BMI demand projections and the production projections based on the past trend, the deficit for 1972 is over 49,000 MT and increases to 113,000 MT in 1980.

The projections of the deficit of milk production seem somewhat high. Even so, they suggest that if things continue in the future as they have in the past, that the demand for milk in the 1970's will undoubtedly increase at a faster rate than the supply. This is substantiated by reports that some of the leading dairy producers are presently selling off their herds to farmers in other Central American countries. In

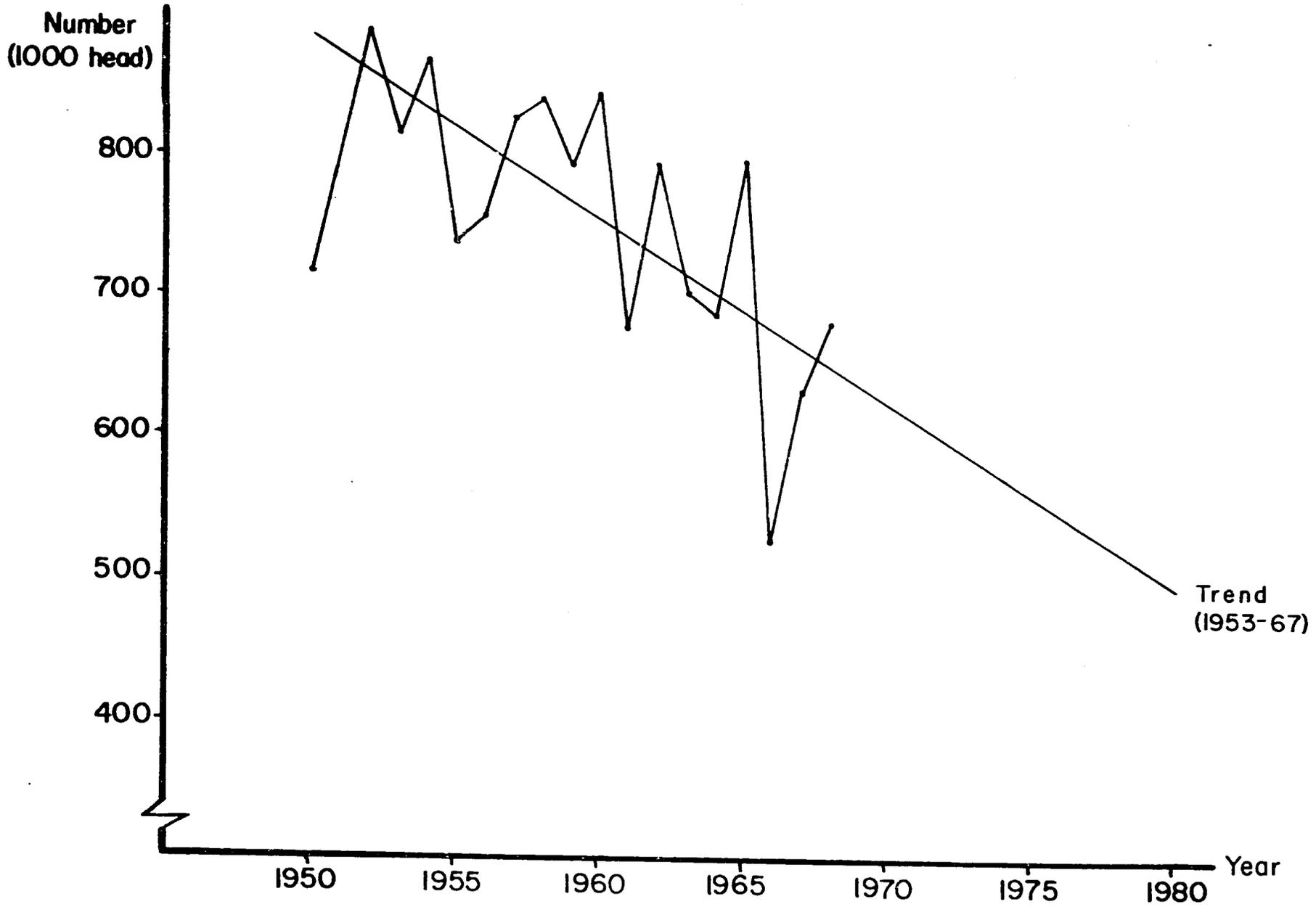
light of this situation, it seems likely that the government will have to allow the price of fresh milk to increase within the next several years. Such action will tend to decrease the amount demanded, increase the domestic production and decrease milk exports to El Salvador. Increases in the amount of credit available to farmers for herd improvement would help to improve the efficiency of the dairy industry and to increase the responsiveness of farmers to a given increase in the price of milk.

The demand projections of the BMI and CNP appear to be based on what consumers should consume rather than on what they will actually consume. Net imports of milk on a fluid milk basis in recent years appear to have been about 10,000 to 15,000 metric tons a year. It is impossible to obtain a precise estimate from the available data because there is no way to determine how much of the different types of processed milk products were imported. It seems unlikely that milk imports will triple by 1980. If they did, imports would still be only 45,000 metric tons which is considerably less than suggested by the available projections. For planning purposes, we have chosen to assume that net imports of milk will be equal to 20,000 metric tons in 1970 and 40,000 metric tons in 1980.

5.5.5 Sheep Production

The estimated number of sheep in Guatemala declined from 826,200 in 1957 to 631,000 in 1967. (See Figure 5.11.) Approximately 90 per cent of the sheep are located in the five North-western departments of Huehuetenango, San Marcos, El Quiché, Quezaltenango and Totonicapan. The average number of sheep per producer in these departments ranges

Figure 5.11: Sheep Numbers



from 10 to 27 with some flocks in the departments of Huehuetenango and San Marcos containing over 100 sheep.¹⁰ The majority of the flocks are owned and managed by the indigenous population.

The types of sheep production in Guatemala can be classified into three groups based on type of grazing and management practices.

1. High Mountain Plains Area -- located principally in the departments of Huehuetenango and San Marcos. Sheep production in this area is confined primarily to the high plains area for most of the year with some migration between the wet and dry seasons. The flocks are larger in these areas often consisting of 100 or more sheep. Wool and meat constitute a large percentage of sheep producers income. Thus it appears that efforts to improve sheep production in Guatemala should be concentrated on this group first. Grazing of native pastures is almost the only source of feed in these areas. Improvement of grazing lands should therefore be given highest priority as a possible means of increasing feed supplies. Indications are that the limited feed intake is partly responsible for the reduced body size and low wool yields of the native sheep.

2. Corn-Wheat and Sheep Sections -- located primarily in the departments of Totonicapán, Quezaltenango and El Quiché. These are mountainous areas adjacent to mountain lands used for growing corn and wheat. Flocks are small consisting of from 25 to 100 sheep. About one-third of the total sheep numbers are in this group. Some forage is

¹⁰Much of the material in this section is drawn from: Milton A. Madsen, Report on Sheep and Wool Production in Guatemala, USAID Report, Guatemala, March, 1966.

obtained from grazing idle corn and wheat lands but there are serious seasonal feed shortages in these areas. Thus increased feed sources will depend to a large extent on the development and utilization of supplemental feeds on the crop lands. It seems unlikely that farmers in this area will divert land used to produce wheat and corn to the production of feed for sheep.

3. Farm Village Areas -- located in the village areas of all departments having sheep. Flocks usually consist of fewer than 25 sheep. Sheep are grazed on village farms. It will be difficult to establish an improvement program for these flocks.

The principle product of the sheep industry in Guatemala is wool. Sheep are usually sheared twice a year yielding from one to one and a half pounds of wool per shearing. The majority of the wool is sent to Momostenango where it is washed and sold. Most of the domestic wool is used in the home industries although some of the finer wools are processed in a commercial mill at Quezaltenango. Unwashed wool in 1966 sold for between Q 0.35 and Q 0.40 per pound with seemingly little price difference in the different quality wools.

The major sheep market is at San Francisco where 100 to 300 sheep are marketed on Fridays. Sheep are sold for cash at prices ranging from Q 4.00 to Q 7.00 with some high quality rams selling as high as Q 15.00 each. Only a few sheep are sold for slaughter in this market.

Mutton is not a particularly popular meat in Guatemala. Relatively little mutton is sold in meat markets in the larger cities. The estimated number of sheep slaughtered was 114,900 head in 1960

and 78,300 head in 1967. (See Table 5.23.) There are very few sheep imported or exported.

The number of sheep in Guatemala is expected to continue to decline during the 1970's. The projected numbers of sheep based on the past trend are:

Year	Thousands of Sheep ¹¹
1970	626
1972	600
1975	561
1980	496

The total demand for mutton and wool during the 1970's is expected to remain equal to the supply.

5.6 Summary

If things continue in the future as they have in the past, Guatemala will be able to export small amounts of beans and rice and fairly substantial amounts of beef and vegetables. It will need to import small amounts of pork and fruits and relatively large quantities of corn, wheat and milk. A summary of the projected surpluses and deficits for the major food products is presented in Table 5.24.

There is no reason to believe that things will continue in the future as in the past. A number of programs have already been proposed for increasing the production of certain agricultural products. Some of these programs will undoubtedly be initiated within the next several

¹¹Projections are based on the least-squares trend line $Q = 756.3 - 13.0 T$ where Q is in 1,000 head and T is in annual units with 1960 = 0.

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TABLE 5.23
LIVESTOCK SLAUGHTERED
(Thousand Head)

Year	Cattle	Hogs ^a	Sheep
1950	161.5	--	--
1951	168.4	--	--
1952	169.8	--	--
1953	164.3	--	--
1954	171.9	--	--
1955	167.1	--	--
1956	168.3	--	--
1957	175.2	--	--
1958	179.9	732.8	117.5
1959	182.9	725.2	177.5
1960	192.6	825.1	114.9
1961	185.1	769.2	161.3
1962	194.1	714.6	92.5
1963	207.3	643.1	64.3
1964	205.6	765.9	86.7
1965	207.9	829.9	65.9
1966	197.8	953.9	100.9
1967 ^b	209.3	1,062.2	78.3

Source: 1950-1958 Ministerio de Agricultura

1959-1960 Banco de Guatemala

Notes:

^aFigures reported by the Bank for hogs appear to be three to four times larger than those reported by other agencies.

^bPreliminary.

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TABLE 5.24
SUMMARY OF PROJECTIONS OF SURPLUSES OR DEFICITS
FOR MAJOR FOOD PRODUCTS

Product	Year	Surplus (1000 MT)	Deficit (1000 MT)	Surplus or Deficit as a Per Cent of Total Production
Corn	1970	--	--	--
	1980	--	87.4 ⁵	(8.9) ³
Beans	1970	8.0 ¹	--	6.0 ³
	1980	17.0	--	9.1
Wheat	1970	--	70.7 ⁴	(152.7)
	1980	--	109.2	(161.1)
Rice	1970	3.0 ⁵	--	11.5
	1980	2.6	--	6.5
Fruits	1970	--	13.4 ⁶	(9.5) ⁷
	1980	--	18.9	(11.2)
Vegetables	1970	58.0 ⁸	--	35.6 ⁹
	1980	40.0	--	22.2
Cattle	1970	15.3 ¹⁰	--	33.5 ²
	1980	22.0	--	34.3
Hogs	1970	--	0.9 ⁴	(5.7)
	1980	--	2.8	(15.4)
Eggs ¹¹	1970	--	--	--
	1980	--	--	--
Milk ¹²	1970	--	20.0	(11.5)
	1980	--	40.0	(18.6)

See Footnotes on the attached page.

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Footnotes to Table 5. 24:

- ¹Based on BMI supply and demand projections.
 - ²Total production based on BMI projections.
 - ³Total production based on trend projections.
 - ⁴Based on linear trend supply and BMI demand projections.
 - ⁵Based on linear trend supply and CNP demand projections.
 - ⁶Based on INCAP supply and CNP demand projections.
 - ⁷Total production based on INCAP projections.
 - ⁸Based on BG supply and CNP demand projections.
 - ⁹Total production based on BG projections.
 - ¹⁰Based on BMI supply and CNP demand projections.
 - ¹¹Based on INCAP supply and BMI demand projections exports would be 2, 800 MT in 1970 and 1, 800 MT in 1980.
 - ¹²See page 47 for a discussion of the significance of the milk deficit figures.
- 

years. The projections as such do not provide enough information to allow us to predict which programs will be most successful. Nor do the projections by themselves serve to indicate what types of programs should be undertaken. The projected 1980 deficit of 109,000 metric tons of wheat, for example, does not imply that a substantial addition to the present program to increase wheat production is needed. The result of such a self-sufficiency program for wheat would undoubtedly be to enlarge the deficit in corn production.

In very broad terms, programs designed to increase grain production would tend to benefit small farmers while programs to increase fruit and livestock production would tend to benefit large farmers. A program for increasing the production of vegetables would probably benefit both large and small farmers.

Similarly, programs designed to increase vegetable and grain production would tend to be labor using while programs directed towards increased production of fruit and livestock products would tend to be capital using. A fruit program designed to diversify coffee fincas would tend to increase the demand for labor during the harvest season for fruit but would reduce the demand for labor during the coffee harvest.

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CHAPTER 6

GOVERNMENT POLICIES AND PROGRAMS AFFECTING AGRICULTURAL DEVELOPMENT

Agricultural growth takes place in areas having a minimal infrastructure of roads and markets, adequate soils, availability of enough water for crop production either from rainfall or irrigation, seed varieties with inherent yield potentials, fertilizer to combine with the inputs of land, seed and labor, and production practices which enhance and conserve the productivity of the inputs. The rate at which growth takes place directly reflects the profit potential of the adoption of new practices and inputs. Government policies and programs must embrace action to enlarge this profitability as an incentive to change, as well as action to assure the necessary services, inputs and technology. Research, extension, storage, processing, markets transportation, are but a part of the essential requisites that must be provided from private or public sources. This chapter is concerned with past government policies and programs in Guatemala and suggestions for changes and improvements.

6.1 Public Revenues and Expenditures in Agriculture

This section focuses on the extent to which public resources are used to support agricultural development. It raises the fundamental question of the need to expand public expenditures and public programs.

The contribution of the agricultural sector to public revenues is analyzed and compared to public expenditures for rural development.

Agricultural taxes are the major source of public revenue in the agricultural sector. Agricultural taxes vary in amount from year to year but do not appear to have changed much in absolute terms during the last ten years (Table 6-1). It may well be that the level of agricultural taxation has declined somewhat. It appears that agricultural taxes as a per cent of gross domestic product in agriculture have fallen from about 3.5 per cent in 1958-1959 to around 2 per cent at the current time.

Agricultural taxes represent about 6.5 per cent of total government revenue. Their share seems to have declined steadily since 1958. Similarly, agricultural taxes as a per cent of total taxes are down to 7 per cent from more than 10 per cent a decade ago. All of these facts point to a consistent tendency for agricultural taxes to decline relative to agricultural production and to taxes elsewhere in the economy.

Direct taxes in agriculture are relatively unimportant at the present time. Guatemala has both income and property taxes but neither produces much revenue from the agricultural sector. There is also a special tax on idle land but it is minor from the standpoint of revenue produced. It should be expected that greater emphasis will be placed on these direct taxes in the future as a means of obtaining more revenue for expanding public programs and investments.

The major agricultural taxes are indirect taxes, largely in the form of export taxes on coffee (Table 6-1). The coffee tax currently represents 80 per cent of total agricultural taxes, although its proportion

TABLE 6-1

GUATEMALA: AGRICULTURAL TAXES
(Current Prices--Thousands of Quetzales)

Year	Total Ag. Taxes	Direct Taxes	Indirect Taxes	Per Cent of Total Taxes	% of Total Government Revenue	% of Ag. GDP	Coffee Export Tax	Per Cent of Ag. Taxes	% of Coffee Production Value	Cotton Export Tax	% of Total Ag. Taxes	% of Cotton Production Value
1958	10,486.4	0.4	10,486.0	11.2	9.5	3.7	10,265.2	97.9	13.4	NA	--	--
1959	9,737.3	0.4	9,736.9	10.3	8.9	3.3	9,590.7	98.5	12.9	NA	--	--
1960	8,331.7	0.3	8,331.4	8.8	7.6	2.8	8,182.5	98.2	11.3	NA	--	--
1961	8,439.5	0.3	8,439.2	8.9	7.6	2.9	8,239.8	97.6	12.8	NA	--	--
1962	7,478.3	3.5	7,474.8	8.2	7.0	2.4	7,315.9	97.8	11.6	NA	--	--
1963	6,773.2	505.4	6,267.8	6.7	6.1	1.9	5,949.2	87.8	8.0	NA	--	--
1964	6,728.0	289.8	6,438.2	6.1	5.6	1.8	5,658.7	84.1	6.3	440.2	6.5	1.3
1965	9,620.9	800.7	8,820.2	7.4	6.6	2.5	8,118.1	84.4	8.8	243.4	2.5	0.6
1966	9,451.0	715.0	8,736.0	7.1	6.5	2.3	8,133.5	86.1	9.7	323.3	3.4	0.7
1967	6,521.0	835.2	5,685.8	NA	NA	2.0 ²	5,162.5	79.2	NA	218.0	3.3	NA

Source: Bank of Guatemala and National Budget Bureau

¹Includes Idle Lands Tax; Starting in 1963 includes Income Tax Estimates Derived by CNP.

²Estimated.

has declined steadily over the ten year period. Coffee export taxes now total less than 10 per cent of the value of coffee production, down from more than 13 per cent in 1958. Export taxes on cotton represent less than one per cent of the value of the crop and slightly more than 3 per cent of total agricultural taxes.

There are two other ways in which transfers can be made from the agricultural sector to promote overall development. One is through price policies. If prices of agricultural products decrease relative to other prices then a transfer takes place through prices for food and industrial raw materials. The main shifts in agricultural terms-of-trade in Guatemala appear to have been in the prices of traditional exports such as coffee and cotton. These shifts result in transfers from Guatemala to importing countries and not between sectors within the economy. There do not seem to have been any strong shifts in terms-of-trade against agriculture as far as domestic products are concerned.

Transfers can also be made through the actions of producers and financial institutions in channeling funds from agriculture into investments in other sectors. The magnitudes of these intersectoral flows in Guatemala are not known. More research is needed to measure the rate of investment of agricultural income, especially by large producers of export crops, in other sectors of the economy as well as in increased agricultural production.

Data were also obtained on aggregate public expenditures (current and capital) for rural development. These expenditures include rural education, road construction, health programs and data collection as well as the services provided by the Ministry of Agriculture and

other government agencies. In 1968, these expenditures totaled about 20 million quetzales and represented 11.5 per cent of total government expenditures (Table 6-2). In 1966-1967, rural expenditures were 13 to 14 per cent of the public budget, while in contrast they were only 6 to 8 per cent in 1960-1964.

There also appears to have been some increase in rural expenditures by the government in relation to agricultural output. Recently, this figure has been about 5 per cent, up from 2 to 3 per cent in the early 1960's (Table 6-2). It is not known to what extent this increase is due to the better classification of rural expenditures in the recent years.

If these data are accepted, they imply that government expenditures in the rural sector have been increasing relative to agricultural taxes. Earlier, this relationship seems to have been about one to one. Since 1965, however, the government has been spending 2 to 4 quetzales in the rural sector for every quetzal it collects in taxes from agriculture (Table 6-2). Only about one-fourth of these expenditures are made through the Ministry of Agriculture. Other important expenditures include rural education, road construction, health, and support of rural development agencies.

Finally, government expenditures were classified into services and social overhead investments. The former includes most of the current work of the Ministry of Agriculture, data collection, and the operation of the autonomous development agencies. The latter includes education, health, roads, and irrigation. Social overhead has represented about two-thirds of total expenditures in recent years (Table 6-2). There appears to have been a shift in favor of more infrastructure investments since 1965. But the level of expenditures in each category is exceedingly low relative to the needs of the agricultural sector for improvement

TABLE 6-2
 GUATEMALA: PUBLIC EXPENDITURES FOR RURAL DEVELOPMENT
 (Current Prices)

	1960- 1961	1963- 1964	1965	1966	1967	1968
Total Rural Expenditures	7,974,406	6,881,411	19,302,126	20,554,477	27,271,700	20,530,046
As % of Total Public Expenditures	7.8	6.0	11.6	13.2	14.3	11.5
As % of Agricultural Gross Geographic Product	2.7	1.9	5.0	5.1	NA	NA
As % of Agricultural Taxes	95.1 ¹	101.9 ¹	200.6	217.5	418.2	NA
Expenditures on Agricultural Services	7,812,626	5,802,141	12,244,378	9,192,416	9,386,399	6,685,357
As % of Total Rural Expenditures	98.0	84.3	63.4	44.7	34.4	32.6
Expenditures on Social Overhead	161,780	1,079,270	7,057,748	11,362,061	17,885,301	13,844,689
As % of Total Rural Expenditures	2.0	15.7	36.6	55.3	65.6	67.4

Source: Calculations based on Bank of Guatemala and National Budget Bureau data.

¹Estimated

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and expansion. Important categories of government outlays for agricultural services and investments are reviewed and evaluated in more detail below.

6.2 Agricultural Research

The history of agricultural research in Guatemala is somewhat spotty. Considerable success was achieved earlier through the joint "Servicio" sponsored by the Guatemalan and United States governments. Currently, it is very questionable that a research program of sufficient scope and continuity exists to provide the new technology and practices required as a base for accelerated agricultural development programs. The main limiting factors seem to be the lack of trained personnel, the low budgetary support for research and the institutional organization of the research program. Moreover, although in proposal programs and projects are substantial funds being suggested for research and investigation, yet the lack of new knowledge and adapted machinery is probably a key bottleneck in achieving economic and social goals in the agricultural sector.

The major agency conducting crop and livestock research is the División de Investigaciones Agropecuarias of the Ministry of Agriculture. There are several other government and private agencies which conduct research, however. The programs of the principal government research agency are reviewed briefly below.

6.2.1 División de Investigaciones Agropecuarias

This Division is part of the same Dirección of the Ministry of Agriculture which includes the Extension Service. It is the largest agency conducting agricultural research. Its budget for 1969 is a little less than Q400,000. It has approximately 50 technicians working in its various stations and programs.

Data for 1967 showed the following distribution of trained personnel:

Ph. D.	2
M. S.	10
Ing. Agr.	7
Perito Agr.	32

A few additional technicians are on leave studying for graduate degrees outside Guatemala. Lack of trained personnel and low salaries are two of the serious problems affecting the work of the Division. The Division carries out its research program at five experimental stations (Figure 6-1). The location and major activities of each station are:

Barcena. - A small station located near Guatemala City; experimental work is concerned with corn, beans, sorghum, peanuts, and vegetables; seed production for improved varieties is carried out at this station.

Cuyuta. - Located in the coastal region at Escuintla; began as a mechanization center under the development financing agency, INFOP; works with corn, sorghum, rice, vegetables, and pastures; reasonably well-equipped station.

Chimaltenango. - Located in the highlands; works with corn, beans, potatoes, wheat, and vegetables; station is relatively new and not well developed nor equipped.

Chocolá. - Located in a coffee area in Suchitúpequez; work is primarily concerned with coffee, but also includes fruits and vegetables; established for more than 20 years but program has suffered discontinuities.

Elabor Ovalle. - Small station located in highlands near Quezaltenango; concentrates on wheat, potatoes, corn, and vegetables and fruits; also, on soil fertility; some financing provided by Wheat Growers Cooperative.

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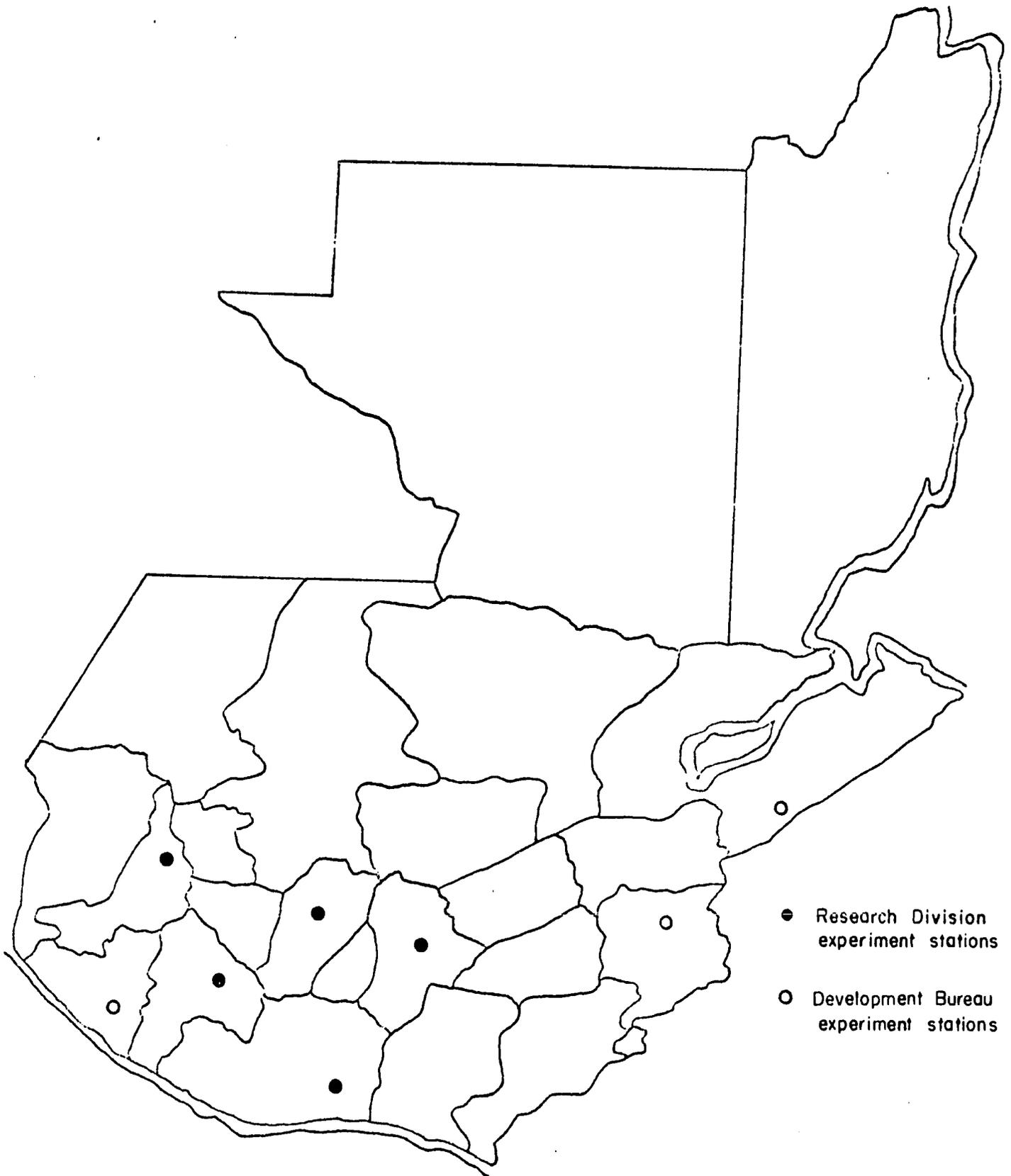


Figure 6.1 Experiment stations operated by the Research Division and the Agricultural Development Bureau (1968)

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6.2.2 Other Experimental Stations and Programs

The major research installation not included in the list above is Los Brillantes, a station located in the department of Retalhuleu and operated by the Dirección General de Desarrollo Agropecuario. This station has excellent facilities and is the site of the diversification program. Research at the station is concerned with rubber, cacao, citrus, spices, and other fruits. There are two other experimental stations of this Dirección which operate as substations to Los Brillantes. This Dirección also carries out a livestock improvement program. There is no apparent coordination of the work of these two research agencies.

Additional research is carried on by the National Coffee Association (ANACAFE), the Central American Institute of Nutrition, the Faculty of Agronomy of San Carlos, and producers of essential oils, sugar and cotton.

Some duplication of research is involved. A good example is the work in agricultural diversification. This is the major concern of Desarrollo but work is also done by Investigación and ANACAFE. Finally, the Ministry has a special department concerned with diversification. There is no apparent coordination of work among these various agencies and no seeming agreement on the objectives and priorities in crop diversification for the country.

6.2.3 Appraisal of Research Programs

The purpose of research is to develop and adapt new technology which is economically feasible for adoption by producers and which raises the productivity of labor and land resources in farming. To be

successful, a research program requires an adequate number of well-paid scientists with facilities and supporting technicians to carry out a long-term, planned program of work free from political interference and bureaucratic restrictions.

An attempt was made in this study to review the major lines of research from the viewpoint of their adequacy as a base for accelerated development programs. Most of the current work is on crop biology: improved varieties, response to fertilization, plant population, and control of pests and diseases. Research personnel feel that the technical basis exists for increasing yields as much as eight times for corn and beans in the central and coastal regions.

Most of the results reviewed were experimental data measuring the responses to one, or at most two, of the factor influencing yields. Emphasis has been placed on varietal improvement and fertilization, especially for corn. Less work has been done on plant population density and other cultural practices.

There are two important limitations in this existing information. The first is the limited replication of experiments over area and time. There have simply been too few experiments to provide more than a general indication of the relation between a specified factor and yields. Given the diversity in soils and climatic conditions in Guatemala, actual responses on farms may be greatly different than those obtained at the experiment stations. Much more needs to be known about this variation and what risk factors are associated with the adoption of the practices by the individual producer.

One illustration of this difference is given by information obtained from the Extension Service. In that agency's 1968 annual report, production

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data for various crops from demonstration plots around the country are summarized and compared to average yields obtained by traditional production methods. These data showed that the improved practices somewhat more than doubled yields for corn and rice and somewhat less than doubled yields for beans and wheat. Nothing is said, however, about the variation in results obtained on the demonstration plots. Two fundamental questions can be posed:

1. Why are yields on test plots only about double average yields when research technicians think increases of 5 to 8 times are feasible?
2. Do the results from the test plots show a secure base for recommending profitable production practices that greatly outweigh the risks and costs of changing traditional methods?

The second limitation is that few experiments have been designed to test a "package" of practices. Often, responses are limited if only one factor is changed. For example, fertilization may exhaust the yield potential of existing varieties at relatively low levels. Or population density and other cultural practices may become limiting if high-yielding varieties are subjected to heavy fertilization. Really dramatic increases in yields will probably require that the combination of varieties, fertilization, and cultural practices be considered together and worked out as a package for various soil types and climatic conditions.

In this connection, it is obvious that little attention has been paid to understanding the agronomic and economic implications of existing production practices in the subsistence sector. Are existing practices

effective or wasteful of soil fertility? Are there changes in cultural practices which could increase yields within the existing structures? Do existing practices reduce or increase the risk of crop failure? How will these risks be affected by the adoption of new technology? Without answers to these questions based on research, it is difficult to see how new practices can be identified which are consistent with the production environment of small farmers and which offer the rate and certainty of return necessary to induce their adoption.

It is equally important that new technology be locally adapted agronomically and tested for its economic feasibility. Some attempts have been made to calculate rates of return on fertilizer use but essentially nothing has been done to appraise the impact of new methods and inputs on optimum cropping patterns by region and on incomes which can be earned by farms of different sizes. Such research will require a major shift in the philosophy, organization, and personnel of the research agencies.

The controversy over mechanization is a good example of the contribution research can make to planning development programs. There is apparently a strong tendency in Guatemala to recommend mechanization of production wherever soil and climate conditions permit. The basis for this recommendation is that mechanization increases productivity per man and reduces per unit cost of production. This recommendation is opposed by those who fear the employment effects on the rural labor force of substituting machines for men. Rational choices can be made only when research shows what mechanization is necessary to permit exploitation of yield-increasing inputs and methods and for multiple cropping in areas where growing conditions would

permit the harvest of two or three crops per year. Such mechanization can be recommended because it is complementary both to the adoption of new technology and to the increased productivity of labor.

6.3 Agricultural Extension

The National Agricultural Extension Service has the primary responsibility for transmitting information on new technology and improved production practices to farmers and stimulating farmers to adopt them. The service was created in 1955 and recently was merged with the organization responsible for promoting the economy of the Indian population. This combined service, which forms a unit of the Dirección General de Investigación y Extensión Agrícola of the Ministry of Agriculture, is organized into three major divisions:

1. Agricultural Extension Service;
2. Indian Economy Development Service;
3. Cooperative Development Office.

6.3.1 Agricultural Extension Service

The Extension Program is carried out through 40 offices located throughout the coastal and altiplano regions of the country (Figure 6-2). The service, from its beginning with 6 offices in 1955, had grown to 30 offices by 1960. This number remained about the same until 1967 when it was increased to 39 in order to cover more completely the northeast departments of Zacapa and Izabal.

Each of the 39 offices is headed by a "Perito Agrónomo" with high-school level vocational training in agriculture and some additional training in extension work. Each office also has an assistant (secretario) who works under the direction of the agent. Home demon-

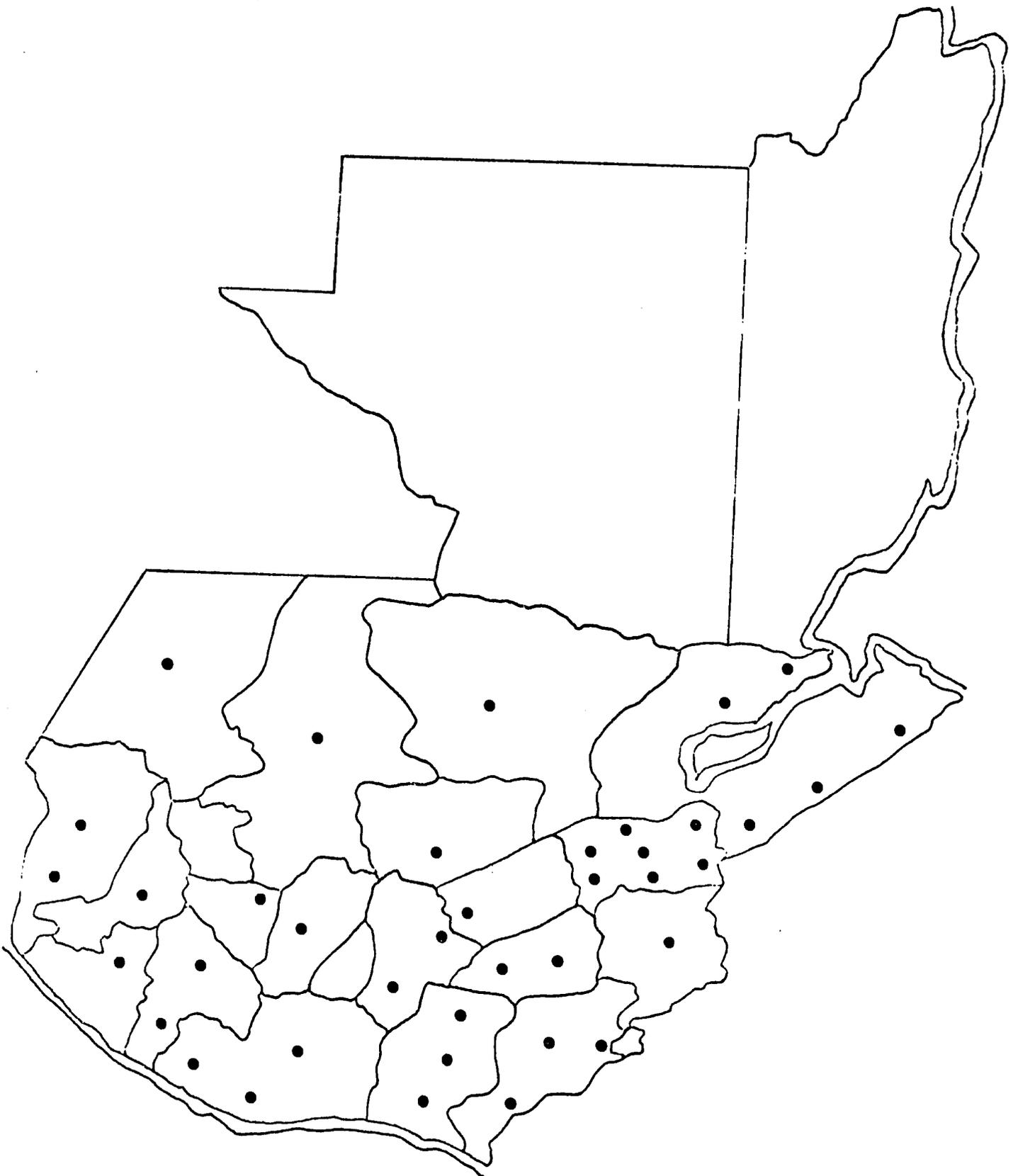


Figure 6.2 Agricultural extension offices operated by the Agricultural Extension Service

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stration agents are assigned to eight extension offices.

The central office includes a director and sub-director and fourteen supervisors and specialists. The extension offices are grouped into five regions, each of which has a supervisor. One extension agent is assigned to the central office in charge of training. There is currently a total of 69 technicians in the service.

Data were obtained on the approximate area of operation of each of the extension offices. At most, the 39 offices in existence cover 25 per cent of the total coastal and central regions. The covered area includes approximately 136,000 rural families. The extension agents, however, work with less than 20 per cent of those families. Each office is reported to serve between 500 and 600 farm families on the average.

The 1969 budget for the Extension Service is Q229,175. The service has received no increased appropriations since its budget was augmented to support the new offices opened in 1967. The service is so small that, in national terms, it provides only about one technician for each 7,500 farmers in the country. Its total budget represents about Q0.50 for each farmer in the country.

6.3.2. Indian Economy Development Services

This department is part of the "División de Extensión y Fomento de la Economía Indígena" of the Research and Extension Agency of the Ministry of Agriculture. It existed previously as an autonomous service and was incorporated into the Extension Service only recently.

The activities of this department are carried out in the northwest part of Guatemala where the Indian population is dominant. The work is organized in four centers located as shown in Figure 6-3. In 1968

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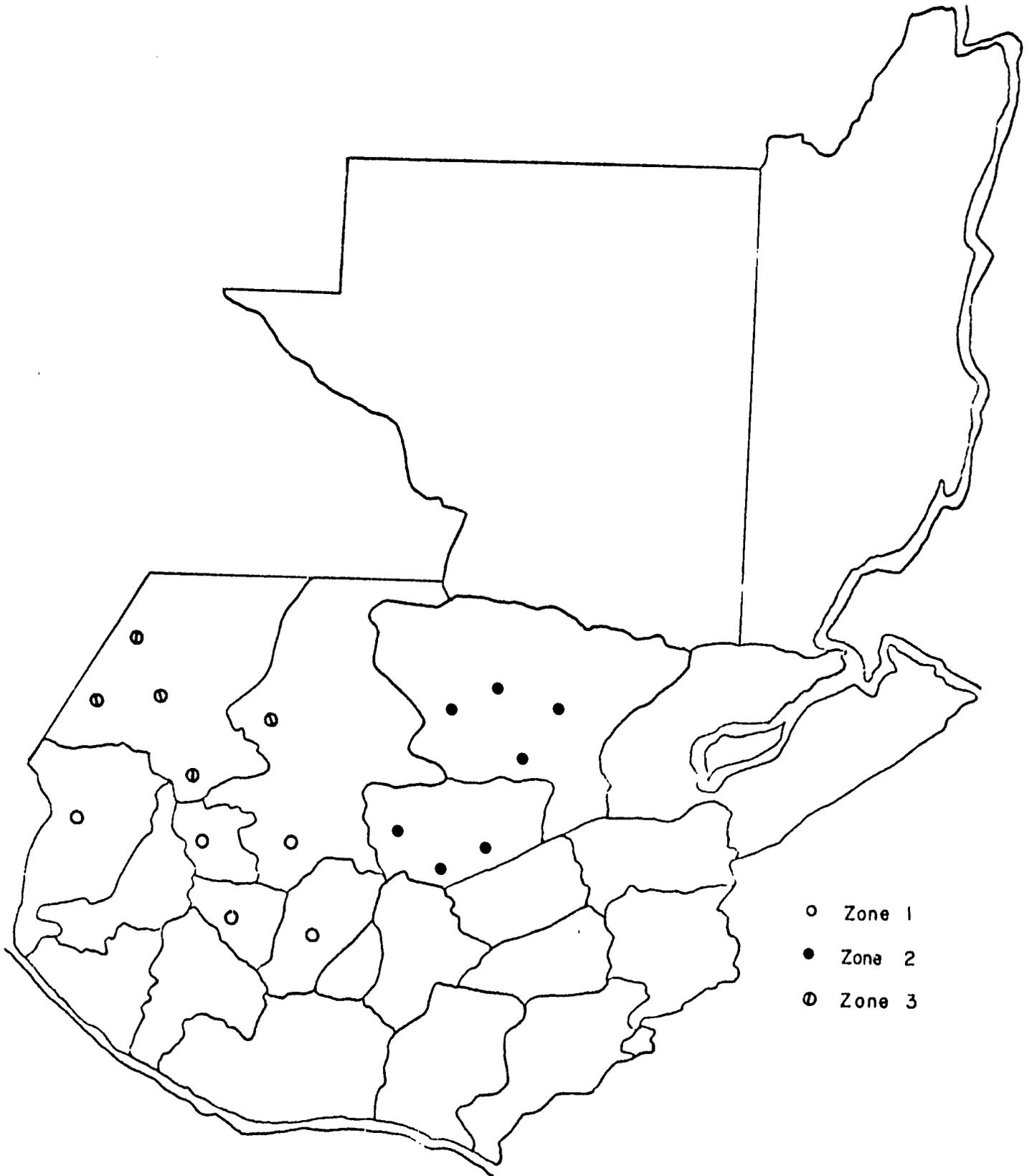


Figure 6.3 Location of extension agents of the Indian Economy Development Service (D.F.E.I.) (1968)

there were 47 technicians working in agricultural activities in these centers and the sub-centers associated with them. Other technicians work in community development, home improvement and handicraft programs. The primary agricultural activity was the use of demonstration plots to provide small Indian farmers more information about improved practices. Work with corn, wheat, beans, and potatoes was emphasized. A total of 1,721 farmers collaborated in the demonstration work, and a total of 27,704 farmers attended the demonstrations. An additional 1,658 farmers were involved in livestock programs carried out by the department.

This department has a budget of Q166,236 in 1969 to support its work in agriculture and handicrafts and in community development. This budget represents approximately Q1.00 for each person in the indigenous population in the area covered by the department.

6.3.3. Cooperative Development Office

This office provides technical assistance and services to existing cooperatives and promotes the establishment of new cooperative organizations. Its budget for 1969 is Q19,561. In 1968, the office worked with 20 existing cooperative units and aided the organization of 85 new ones. A total of 14,000 farm families were involved in the 291 co-ops.

6.3.4. Other Extension-Related Agencies

S. C. I. C. A. S. - (Servicio Cooperativo Interamericano de Crédito Agrícola Supervisado) In its supervised credit program, S. C. I. C. A. S. operates 15 agencies located in the coastal and altiplano regions. There are 19 technicians assigned to these offices. The agency claims to have

made loans to 8,760 farmers in 1967. Obviously, little supervision could be given to each borrower. The agency is planning to increase the number of its offices to 24. It has recently received a \$4,500,000 loan from the Interamerican Development Bank to expand its supervised credit activities.

INTA. - (Instituto Nacional de Transformation Agraria) INTA has the responsibility for a broad and comprehensive development program in the agricultural development zones which it directs. Its activities range from agricultural extension and home improvement to road building and school operation. The Agency employs a total of 40 Peritos Agronomos who work as "promotores de desarrollo rural" to provide technical assistance in the parcelamientos (Figure 6-4). It is estimated that about 4,500 families are involved in the areas but not all areas have active extension programs. Offices of the extension service are located in 4 parcelamientos and SCICAS has provided credit for a few of the parcelarios. In general, however, the various agencies have not worked closely together.

Agricultural Development Bureau. - This is one of the largest departments of the Ministry and carries out both research and extension activities. It works with crops for domestic food production, with special crops that have export potential and with livestock. Some of its promotion activities reach individual farmers. It is estimated that this agency provides direct technical assistance to not more than 5,000 producers. There is no clear division of research and extension work between the research and extension divisions and this bureau. Responsibilities seem to be overlapping with respect to functions, crops and regions.

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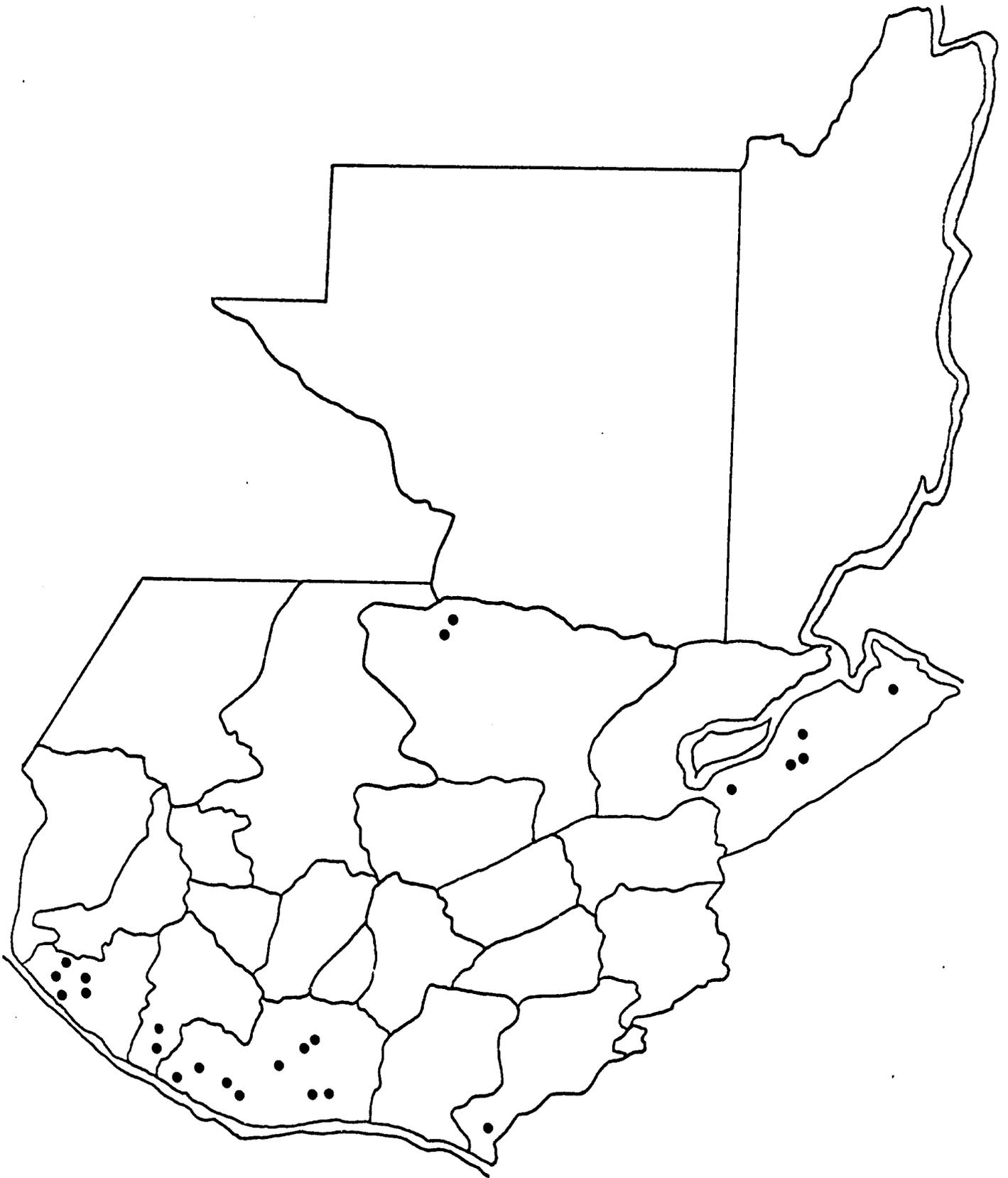


Figure 6.4 Location of Extension Workers of INTA

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6.3.5. Summary Comments on Extension

The first fact deserving emphasis is that expenditures on agricultural extension programs in Guatemala are extremely small. Even if generous provision is made for the extension-related activities described above, no more than Q500,000 is currently being spent in the country for technical assistance to farmers. This figure represents little more than Q1.00 per farm. Substantial increases in budget support will be required if extension programs are to be improved in the future.

At the same time there is obvious duplication and lack of coordination in the existing extension effort. That is to say, the resources now available for extension are not being used as efficiently as they could be. The multiplicity of agencies carrying out extension programs is the most obvious deficiency. For example, offices of the Agricultural Extension Service are located where the Indian Economy Development Service operates. Even if these various programs did not overlap each other, the current organization involves too many resources in administration and too few in actual field operations. Also, an effective system of regional and national specialists is not possible with the existing fragmentation of services and programs.

In fact, however, existing programs do overlap. This is true both in respect to crops and to geographic areas. Several agencies are charged with working on basic food crop and/or with small farmers. Centralization of extension programs in one agency would permit more coordination and control to be exercised. Existing resources could be used more efficiently in terms of the realization of the goals of extension. The overlap is not so much a problem of too many extension personnel

working with the same farmers; extension resources are too small and thinly spread to overlap in this way.

The expected deficiencies in number and quality of personnel in extension exist in full measure. Salaries are low so the agencies cannot attract and hold well-trained technicians. At the same time, few people are being trained with the skills and preparation to be effective extension workers.

As far as we know, no cost-effectiveness studies of extension activities have been made. Yet, where budget support is so limited, such studies are essential if available resources are to be used as effectively as possible.

At this point, it could be assumed that one extension agent is needed for a given number of farmers (e. g. , one agent per 200 farmers) and the personnel needed for extension derived. Depending on the ratio chosen, we could conclude that Guatemala "needs" one to two thousand extension agents, and a 20-fold increase in budgeted expenditures. Such increases are obviously not feasible in the foreseeable future. The danger with this approach is that it is based on the implicit premise that whatever additional funds can be made available should be used to expand extension along conventional lines. This premise should be questioned. The case for more extension should be based on cost-benefit considerations, and extension programs should be supported as needed in a comprehensive program designed to generate the highest returns possible for the money available. Returns may or may not be highest for immediate expansion of the familiar form of extension activity.

6.4 Agricultural Education

The provision of a growing number of trained persons with

scientific and practical knowledge and skills is essential for long-term agricultural growth. The process of strengthening educational institutions has already begun in Guatemala but efforts must be accelerated if the trained manpower bottleneck is not to thwart all efforts for change and improvement.

6.4.1 Secondary and Higher Education

Higher education in agriculture in Guatemala is carried out by the Faculties of Agronomy and Veterinary Medicine of San Carlos University. The University is state-supported but autonomous and is one of the oldest in the Western hemisphere.

The Faculty of Agronomy was created in 1950. By 1968, it had graduated a total of 60 Ingenieros Agronomos. Current enrollment in the Faculty is a little less than 100, but this number will increase due to a reorganization of the basic studies program in the University. There are 6 full-time, 4 half-time and 20 part-time professors in the Faculty. Plans have been made to produce more agronomists each year and this appears to be an important goal for the country.

The Faculty has experimental fields and professors are doing some research. However, there are no funds specifically to support research. There is little or no coordination of the Faculty with research and extension activities of the Ministry of Agriculture.

The Faculty of Veterinary Medicine was begun in 1957. By 1969 it had awarded 50 degrees and 22 students had degrees pending. There are currently 30 students in the Faculty, almost half from countries other than Guatemala. The Faculty has 28 professors, 25 of whom are full-time.

The other important institution training agriculturists in Guatemala is the National School of Agriculture located near Guatemala City. This school is administered by the Ministry of Agriculture and provides training in vocational agriculture at the high school level. At the completion of a three-year program students receive the degree "Perito Agronomo." It began in 1921 and has awarded a total of 832 graduates. In 1968, there were 308 students at the school of which a total of 42 graduated. The school has a faculty of 25 full- and part-time professors. Plans are in progress to improve the physical plant and curricula and to increase the number of graduates each year to about 100.

Additional training in agriculture at the high school level will be provided by regional schools which are to be constructed for vocational and teacher training. These schools, and the expansion of the program at Barcena, will soon begin to ease the shortage of persons with pre-university training to staff public and private agencies.

6.4.2. Rural Primary Education

It is estimated that there are about 700,000 children of school age (7-14 years) in rural Guatemala. Only 17 per cent of these children are actually in school; this proportion is lower in Indian areas and higher in Ladino communities.

Schools in rural areas normally have no more than three grades. Ninety-five per cent of rural children attending school are, in fact, attending the first grade. Few rural children progress beyond third grade; the total number of rural children completing sixth grade in 1967 was only about 1,000.

6.5. Agricultural Credit

Credit for agricultural production in Guatemala is obtained from both private and public sources. In 1964, about 55.5 million quetzales were provided by public and private banks and credit institutions (Table 6-3). Other major sources of credit for farmers are input supply companies, processors and buyers of agricultural products, and local merchants and moneylenders. Credit unions also provide some credit but they are not very important. The total credit available to the agricultural sector is not known.

Most of the credit provided by financial institutions goes to export crops. Coffee and cotton alone accounted for almost 75 per cent of private-bank credit and 44 per cent of public credit in 1964 (Table 6-3). Other export crops also received important quantities of public (rubber) and private (sugar) credit. Public agencies granted 19 per cent of their credit for cattle production and the private banks allocated 10 per cent for this purpose. Basic crops as a group received only 13 and 2 per cent, respectively, from public and private agencies.

The data in Table 6-3 imply that most credit goes to large farmers for export crops. The two public agencies which have primary responsibility for providing credit to small farmers are the Banco Nacional Agrario and SCICAS. Both of these agencies maintain credit offices throughout the coastal and central departments (Figures 6-5 and 6.6). However, these two agencies together account for only about 5 per cent of the total credit supplied by the public and private agencies. Moreover, loans are made annually to about 10,000 farmers, which is only 2 to 3 per cent of the small farmers in the country. A major expansion in credit reaching the small producers of domestic food crops

AMOUNT OF CREDIT GRANTED FOR AGRICULTURAL PRODUCTION
BY PRIVATE BANKS AND PUBLIC INSTITUTIONS IN
GUATEMALA, BY PRODUCTS, 1964

Product	Public Credit ¹ (Q1000)	Private Banks (Q1000)	Total Credit (Q1000)	Per Cent of Total Credit	
				Public	Private
A. <u>Basic Crops</u>					
Corn	1,000	300	1,300	5.2	0.8
Beans	700	200	900	3.6	0.6
Rice	280	80	360	1.4	0.2
Wheat	460	110	600	2.6	0.3
Potatoes	80	20	100	0.4	0.1
Total	<u>2,550</u>	<u>710</u>	<u>3,260</u>	<u>13.2</u>	<u>2.0</u>
B. <u>Other Crops</u>					
Coffee	2,500	12,900	15,400	13.0	35.7
Cotton	6,000	14,000	20,000	31.0	38.7
Sugar	450	1,800	2,250	2.3	5.0
Sesame	60	120	200	0.4	0.3
Vegetables	300	1,500	1,800	1.6	4.1
Cocoa	20	110	130	0.1	0.3
Rubber	3,000	370	3,370	15.5	1.0
Bananas	--	--	--	--	--
Other Crops	200	400	600	1.0	1.1
Total	<u>12,550</u>	<u>31,200</u>	<u>43,750</u>	<u>64.9</u>	<u>86.2</u>
C. <u>Livestock</u>					
Cattle	3,700	3,630	7,330	19.1	10.0
Hogs	13	140	153	0.1	0.4
Sheep	4	0	4	0.0	0.0
Poultry	513	500	1,013	2.6	1.4
Total	<u>4,230</u>	<u>4,270</u>	<u>8,500</u>	<u>21.9</u>	<u>11.8</u>
D. <u>All Products</u>	19,330	36,180	55,510	100.0	100.0

Source: Bank of Guatemala

¹Public Credit includes loans by SCICAS, BNA, INFOP and CHIN.

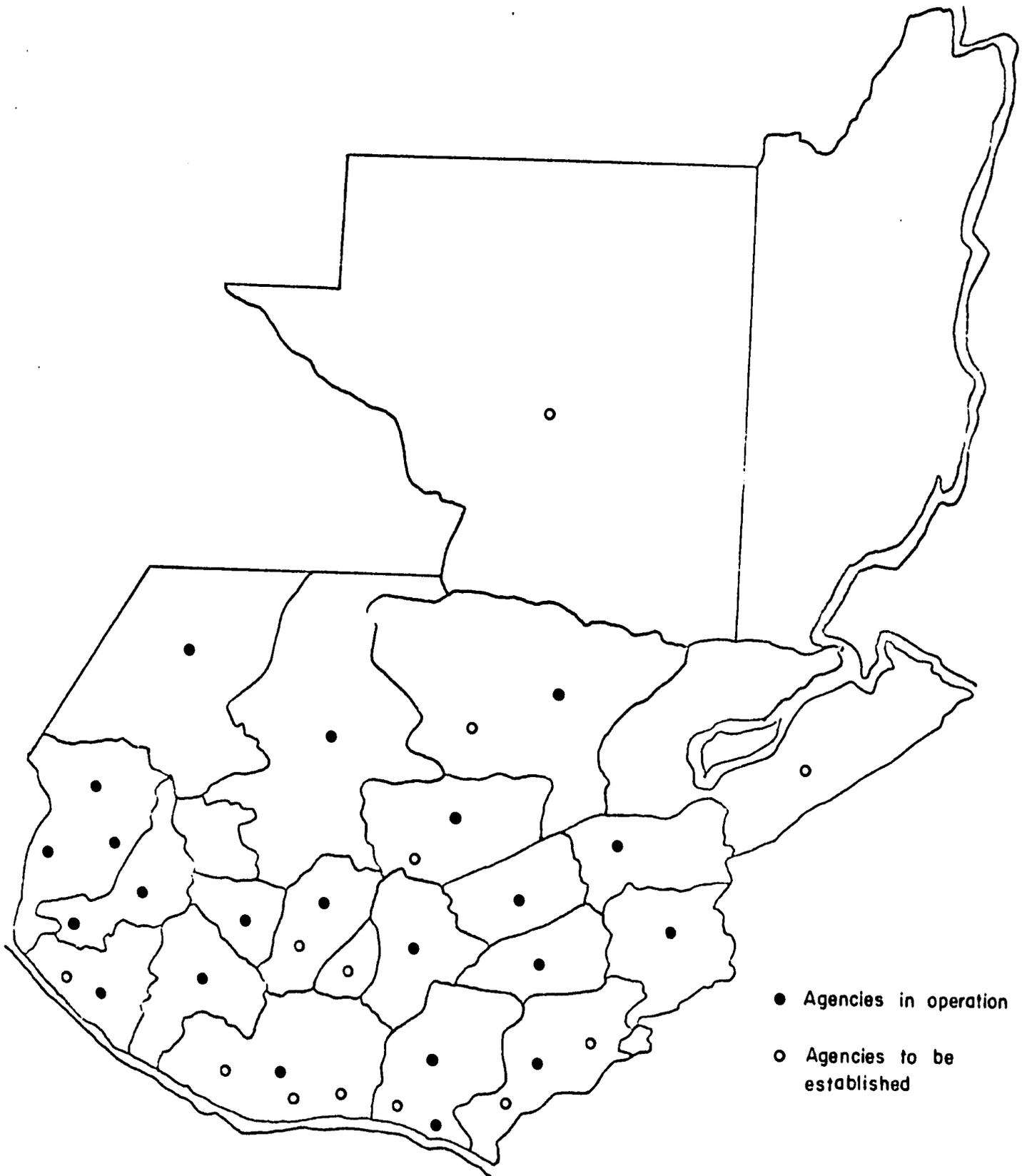


Figure 6.5 Credit offices of the National Agrarian Bank (B.N.A.) (1968)

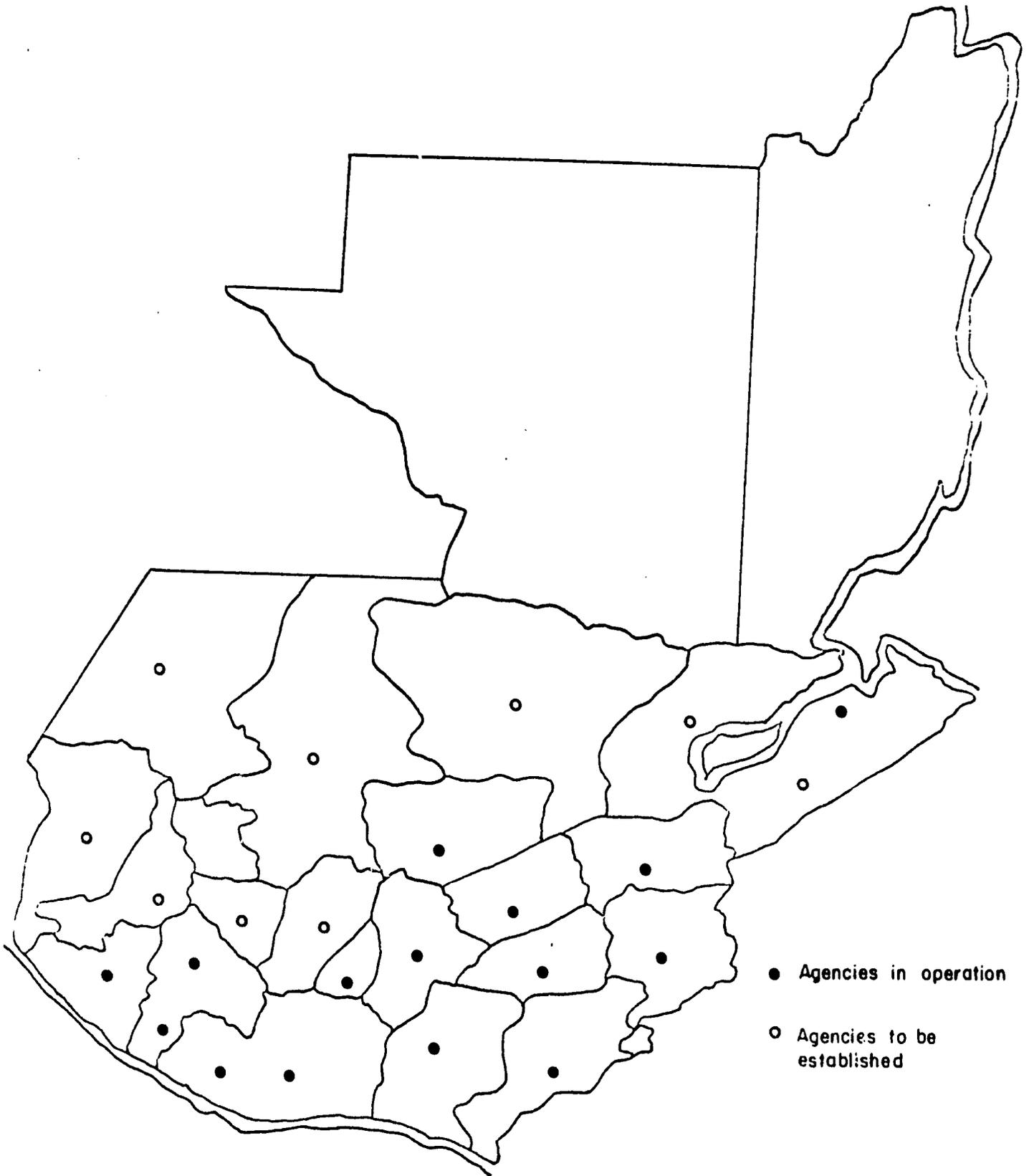


Figure 6.6 Credit offices of S.C.I.C.A.S. (1968)

will be required if widespread agricultural growth and change is to take place.

6.6. Agrarian Reform and Colonization

Given the highly unequal distribution of land in Guatemala it is not surprising that reform-minded governments have tried in the past to carry out land reform programs. The constitution adopted in 1945 prohibited the growth of latifundios and provided for expropriation of land with compensation. The government also encouraged the formation of labor unions on large plantations and initiated legal action to control land rents and force landlords to rent idle land to other farmers at fixed rates. But no specific agrarian reform program was introduced until the Law of Agrarian Reform which formulated the Arbenz program was passed in June 1952.

The major stated objection of this legislation was to provide land for those who had none or very little as a means of developing agriculture and the country. Government land was to be distributed and private property to be expropriated with compensation provided through long-term agrarian bonds. In implementing the program, emphasis was placed on speedy distribution of land. Programs for credit, technical assistance and community development were poorly managed and badly underfinanced. Many farmers were given parcels too small to support a family and boundaries were often not adequately defined nor titles clear. The program was abruptly halted when the government of President Arbenz was overthrown by revolution in June 1954. Most of the land was subsequently returned to its original owners.

A new plan was enacted into law in February 1956. Although

providing land for the landless was included as an essential element of the new plan, emphasis was placed on the colonization and resettlement of lands already held by the government and not on the transfer of private land. While the law provided for possible expropriation of unused private land, this provision has not been used. Instead, government policy toward landlords has rested on a tax against idle lands which, it was assumed, would induce large landowners either to start using their idle lands or to dispose of them.

The heart of the existing program is the creation of Agricultural Development Zones, which are made up of moderate-sized farms (parcelas) and small lots for business establishments and artisans. Land for the zones has been supplied from large tracts held by the government. The program is administered by INTA, and is designed to consist of extensive programs of assistance and social and economic development.

From 1955 to 1966, a total of 26 zones were created (see Table 4-2). These zones contained 4,481 parcels which had been delivered to farmers. The total population in these zones was estimated to be 112,162 persons. About 20,000 families had been benefitted through receipt of small rural or urban lots or through the establishment of communal agrarian properties. A little more than 100,000 hectares were distributed in farm-size parcels and almost 60,000 additional hectares in small lots and communal properties. The zones are located mainly in the south coast with the exception of the few areas opened in the northern and eastern departments. Most of the zones were settled or resettled between 1955-1963.

As was mentioned in Chapter 4, corn is the most important crop produced in the zones. Data on corn production for 1965 were obtained

from INTA for most of the zones and are given in Table 6-4. The zones produced in total about 23 per cent of the production of corn in the country on 8 per cent of the total area devoted to corn. Thus, yields were higher in the zones than in the other corn regions, especially the central highlands. The highest yields were obtained in those zones in the south coast where double-cropping is common. Technical assistance and credit are also provided to encourage seed improvement, better soil and crop management, use of fertilizer and weed and pest control.

INTA has attempted to carry out comprehensive programs of economic and social development in the zones. Access roads have been built. Farmers have been assisted in constructing housing and buying machinery. Agricultural extension and supervised credit are offered. School and health facilities have been established. Cooperative and community organizations have been organized.

Although the programs in the zones are probably underfinanced and possibly poorly administered, they undoubtedly will result in improved levels of living for those farmers fortunate enough to be chosen to receive parcels. The government is encountering difficulty however in meeting the expense of the operation of the zones. As a result, it does not appear likely that the government will create additional zones in the foreseeable future. The government appeared to have been spending about two million quetzales per year on this program until 1968 when INTA's budget was reduced drastically.

The real issue, therefore, is the small number of families which have been settled in the zones at what cost and with what results. For the 1955-1966 period, an average of less than 500 families were

TABLE 6-4

AREA, PRODUCTION AND YIELDS OF CORN IN THE
AGRICULTURAL DEVELOPMENT ZONES, IN 1965

Zone	Area (Has.)	Production (MT)	Yield (KG/HIA)
La Maquina	13,974.8	50,600.0	3,621
Monterrey	2,236.0	5,888.0	2,633
Sta. Elena and Guatalon	541.5	277.0	512
Nueva Concepción	14,963.5	49,254.5	3,292
Cuyuta	1,100.5	1,751.4	1,591
El Arisco	631.7	1,247.5	1,975
El Cajon	293.5	575.0	1,959
Los Angeles	139.7	414.0	2,963
Sta. Izabal	250.1	121.9	487
Caballo Blanco	619.1	1,354.6	2,188
Santa Fe	260.6	321.6	1,234
El Rosario	21.7	45.6	2,101
La Blanca	4,114.2	8,667.1	2,107
El Reposo	937.7	1,349.8	1,439
Las Cabezas	357.8	470.5	1,315
Navajoa	279.5	552.0	1,975
Virginia	252.2	498.2	1,975
Santa Ines	349.4	460.0	1,317
Sta. Tomás de Castillo	21.0	41.4	1,971
Montufar	10,341.4	21,877.6	2,116
Sebol	1,257.7	1,656.0	1,317
Total	52,943.6¹	147,423.7²	2,785

Source: Department of Statistics, I. N. T. A.

¹Represents 7.8 per cent of corn area for 1965.

²Represents 22.8 per cent of corn production for 1965.

settled each year. Only slightly more than one per cent of the farms in the country benefit from the services offered by INTA. There seems to be little hope that the present program can make any substantially larger impact on the pressing problems of productivity and poverty in Guatemalan agriculture.

A second colonization program is being carried out by an agency charged with developing the Peten region (FYDEP). The work of this agency is being assisted by FAO. The government budgets about 1.75 million quetzales annually to this agency. Available data suggest that less than 500 private farms and 14 cooperative farms have been created to date. Some of the major problems which have been encountered include:

1. poor soils and lack of knowledge of optimum production and soil management practices;
2. lack of land titles, credit and technical assistance;
3. poor access roads, or none, and lack of markets and marketing facilities;
4. deficient budget support for the colonization agency.

It would appear to reasonable to conclude that colonization projects have proven expensive in Guatemala in relation to the number of farms created and jobs provided and the amount of land brought into production. There is still land available for settlement in Guatemala, especially in the northern parts of Huehuetenango, El Quiché and Alta Verapaz, in Izabal and in parts of the Peten. Construction of roads and other facilities will permit spontaneous settlement to take place, a process which is already underway. The question remains as to what government expenditures would be required to raise the rate of colonization to a significant level. Funds are not likely to be available to mount a major effort. Thus, the progress in colonization has been, and is likely to remain, slow; other policies and programs must be formulated and implemented to meet the basic needs of agricultural development in Guatemala.

6.7. Agricultural Projects

Much emphasis is currently being given in Guatemala to the preparation of agricultural projects. The strategy appears to be one of obtaining international financing for a wide variety of projects as a means of expanding government investments in rural development without the necessity to mobilize more public revenue domestically. Many of these projects were reviewed and were found to be deficient in the analysis of their potential costs and benefits. Some of them appear worthwhile and deserve to be supported.

Even if all of them were to be carried out, a maximum of 60,000 hectares of land would be brought into production or improved as a result. The costs would be not only the direct capital investment involved but also the concentration of the resources and capabilities of government agencies on planning and executing these projects. The potential for implementing other policies and programs designed to bring improvements to large numbers of existing farmers would be seriously impaired as a result.

6.7. Government Policies to Accelerate Agricultural Development in Guatemala

Possibly the first essential element in accelerating agricultural development is the commitment of the government to a sound set of strategies undistorted by the requirement that they also serve political ends. A clear vision of what is and what will be needed to achieve rural economic advancement is required in developing these strategies. Policies and programs must be supported by the concerted actions of government agencies. Responsibilities for planning and implementing

policies and programs must be rescued from a morass of overlapping agencies that separate related functions and group separate functions, confuse lines of authority, and develop bureaucracies that emphasize self-preservation rather than performance and institute staff policies that provide few incentives or opportunities for progress and achievement by technicians.

This national commitment will require the mobilization and expenditure of a steadily increasing quantity of resources directed to a wide range of activities. Expenditures and investments must be matched to the specific institutional and service needs of agriculture at each stage of its development and in each of the different geographic areas of the country. They must fully recognize the role of agricultural development in promoting growth by the non-agricultural sectors of the economy. They must emphasize those investments to be made by the government if they are to be made at all and those which establish the climate and strengthen the incentives for private participation in rural development.

A particularly important claimant on public expenditures is agricultural research. It has been demonstrated over and over again that public investments in agricultural research have generated phenomenal returns for farmers and society. Research can generate the possibilities for dramatic increases in productivity and yields that provide the leverage for change of traditional production patterns.

Agricultural development strategy can be initiated with imported technology, even imported seed, but investments in domestic research must be forthcoming in growing amounts to meet the needs of continuing development. Research in agriculture can be highly location-specific

because of differences in climate, diseases and insects and other reasons. To this extent, agricultural technology must be developed, adapted for, and tested for each region of the country.

Research must also be continuous and on an ever increasing scale. As new varieties spread, as fertilizer use increases, and as farming practices are changed, new problems will arise. Disease and insect threats will multiply and intensify. Agronomic practices will need to be improved as farmers became more skilled in scientific agriculture.

As technical information accumulates, a demand for extension services of increased competency will be generated. Part of this demand can be met by private suppliers of farm inputs but an important part of it must be met by government extension services that link the research organization to the farmers. Before such services are built, however, local research must have found something worthwhile to extend. Unless new technology is available, that can offer high returns to its adapters, there will be little pay-off from investments in extension. Such investments can accelerate development only when there is information to extend which is relevant and profitable for farmers to adopt.

Similar comments can be made about the role of agricultural credit. Subsidized credit has sometimes been treated as the requisite for agricultural change. Unfortunately the credit provided to small farmers has often been diverted to consumption and became overdue bad debt because there was nothing productive for farmers to purchase. But there is no reason to believe that small and poor farmers cannot be responsible borrowers where credit is provided for purchases of inputs of proven productivity. If credit and extension programs fail to evoke

change, the productivity of the practices being promoted should be scrutinized. It is difficult to find examples where highly productive and profitable technology that is tested and proven and made available to farmers along with the requisites for its use has remained "unadopted."

The role of investment in agricultural education deserves a prominent place in public sector planning in Guatemala. It is well known that underlying the entire course of agricultural development there must be an ever-expanding body of persons skilled in the agricultural sciences. A dearth of trained people can place a serious constraint on improvement efforts in the country. It takes time to train scientists, develop a successful research program, and institute effective extension service. The time to start developing such activities is now; Guatemala can no longer afford to act as if scientists and other highly-trained workers will not be needed in the future. Some specific suggestions for expanded training and reorganized education and research programs are given in Chapter 9.

Attention needs to be given also to making the most productive use of the pool of persons already trained in agriculture. Personnel policies, wages and benefits, professional facilities, and similar factors require urgent attention if the flow of services from scarce skilled manpower is to be efficiently utilized.

CHAPTER 7

GRAIN STORAGE REQUIREMENTS

7.1. Introduction

Corn is the most important food grain grown in Guatemala. It accounted for about 24 per cent of the total value of agricultural products consumed in 1966 and comprises over 90 per cent of the cereals in the diets of many Guatemalans. Total corn production in 1967 was over 750,000 metric tons.

Rice and wheat are becoming increasingly important food grains in Guatemala. Wheat production in 1966 was slightly over 40,000 metric tons while rice production was reported to be about 30,000 metric tons. Total production of rice and wheat by 1980 is expected to be about 110,000 metric tons while corn production is expected to be around 1,020,000 metric tons.

The marketing problems involving wheat and rice are minor compared to those involving corn. Some additional storage facilities are needed for wheat. More efficient drying and milling facilities are needed in some rice producing areas. The flour millers and rice wholesalers appear capable of handling these problems on their own when it becomes profitable to do so. Thus most of our attention in this chapter will be directed towards corn.

Most of the key marketing problems involving corn are in some way related to the lack of adequate corn storage and drying facilities.

The lack of drying facilities causes substantial losses of corn at the farm level and to some extent in the marketing channels. The lack of storage facilities causes corn prices to vary considerably more during the year than they would otherwise. The variability of corn prices may benefit those who are able to hold substantial amounts of corn for three to six months but it does not help the small corn producer who needs cash at harvest time or the consumer who buys only a small amount of corn at a time. Thus stable prices for corn is frequently cited as an important objective of the Guatemalan government.

Most of the grain marketed in Guatemala moves through private marketing channels. Some imported wheat and corn and a limited amount of domestic corn moves through the government's storage facilities but all of this grain is ultimately marketed through private channels.

The government exercises very little control over grain marketing. It has a grading system for the corn that it purchases but no enforced grading system for private dealers. The government has been successful in maintaining its support prices for wheat but not for rice or corn. Nor has the government been successful in implementing its standard warehouse act for grains.

7.2. The Grain Marketing System

The grain marketing system in Guatemala varies somewhat from region to region depending on transportation facilities, the government agencies located in the region, the type of grain involved and whether or not the region is a net importer or exporter of grain. In general terms, the farmers sell their grain to truckers who sell it to wholesalers and

processors who in turn sell to both wholesalers and retailers.

No survey data are available on the percentage of the grain production marketed. Unofficial estimates suggest that from 40 to 80 per cent of the corn production enters the market system depending on the region. Many farmers sell some corn at harvest time and buy corn later in the year. Much of the corn marketed is bought and sold in small quantities in local markets. It appears likely that between 60 to 80 per cent of the rice and around 95 per cent of the wheat production enters the market system. The high percentage of wheat marketed is partly due to the relatively high price of wheat set by the government which encourages farmers to sell some wheat which they might otherwise consume on the farm.

7.2.1. Rice

Until recently the production of rice was concentrated mostly in two major areas. The first of these is along the southeastern border near El Salvador. Roughly two-thirds of the rice produced during the 1950's came from the departments of Jutiapa and Santa Rosa. The second major area of rice production was in the western departments of San Marcos, Quezaltenango and Retalhuleu. The department of Izabal on the north coast has become an important producer of rice in recent years and will probably become an increasingly important production area in the future.

Owners of rice mill usually purchase the rice at harvest time when prices are low and hold it for sale later at higher prices. The Dirección General de Mercadeo Agropecuario reported a total of 36 rice mills in Guatemala in 1968. (Table 7-1) The government has set a guaranteed

TABLE 7-1.

NAME AND LOCATION OF RICE MILLS IN GUATEMALA, 1968

Department	Name of Mill	Address
Guatemala	Pezzarossi	1a. calle 4-21, zona 1
Guatemala	San Antonio	Carret. Roosevelt 5-37, zona 7
Guatemala	Segovia	21 calle 11-22, zona 1
Guatemala	La Famosa	18 calle 17-42, zona 10
Guatemala	San Luis	3a. calle 1-72, zona 7
Guatemala	Castalia	Ruta al Atlántico, km. 16 1/2
Guatemala	Central	Calle S. Juan 5-32, zona 7
Guatemala	San Francisco	1a. calle 1-19, zona 9
Guatemala	Granja Asociada-FERCO	Ruta 7 2-17, zona 4
Santa Rosa	Ipala	Chiquimulilla
Santa Rosa	San Luis	Chiquimulilla
Santa Rosa	San Felipe	Chiquimulilla
Santa Rosa	Los Leones	Fca. El Jovito, Chiquimulilla
Suchitepéquez	La Florida	Av. La Libertad #32, Maza.
Suchitepéquez	La Esperanza	Cuyotenango
Suchitepéquez	Santo Domingo	Santo Domingo
Retalhuleu	Quezada	Av. del Ferrocarril #5
San Marcos	Triángulo	Pajapita
Alta Verapaz	San Mastún	Lanquín
Alta Verapaz	Transvaal	Transvaal, Cahabon
Zacapa	Orquidea	Gualán
Zacapa	Sin nombre	Gualán, Barrio La Estación
Zacapa	Sin nombre	Teculután
Chiquimula	El Socorro	Esquipulas
Chiquimula	Ipala	Ipala
Chiquimula	Berganza	3a. calle Oriente, Chiquimulilla
Jutiapa	San José	Jutiapa
Jutiapa	Santa Isabel	Jutiapa
Jutiapa	Benito Mencos	Salida para Jerez
Jutiapa	La Campana	Jutiapa
Jutiapa	La Palma	El Progreso, Jutiapa
Jutiapa	La Buena Fé	Santa Catarina Mita
Jutiapa	El Fígaro	Moyuta
Jutiapa	Oriental	Progreso
Izabal	La Marina	Puerto Barrios
Izabal	Irguana	Puerto Barrios

Number of Mills: 36

Source: Dirección General de Mercadeo Agropecuario.

TABLE 7-2
 GUARANTEED PRICES FOR RICE AND PURCHASES BY
 AUTHORIZED AGENTS OF INFOP

Crop Year	Rice Prices (Q per 100 lbs.)		Purchases (100 lbs.)	Number of Mills
	Long Grain	Short Grain		
1960-1961	4.25	3.50	9,244	3
1961-1962	4.25	3.50	5,865	4
1962-1963	4.25	3.50	51,019	8
1963-1964	4.25	3.50	86,975	10
1964-1965	4.25	3.50	109,742	12
1965-1966	4.31	3.50	100,518	5
1966-1967	4.41	3.58	NA	NA
1967-1968	4.41	3.58	NA	NA

Source: 1960-1966 Data: Luis Felipe Excobar Codindres, Soluciones Prácticas al Problema de la Comercialización de Granos en Guatemala, Thesis, Universidad de San Carlos de Guatemala, September, 1966.
 1966-1968 Data: INFOP.

support price for rice each year since 1961. (Table 7-2) The Instituto de Fomento de la Producción (INFOP) is responsible for carrying out the price support program and does so by designating some rice mills as authorized buying stations for rice. These mills purchased slightly over 4,600 metric tons of rice under agreement with INFOP during the 1965-

1966 crop year. Purchases by authorized agents in earlier years are presented in Table 7-2.

The guaranteed prices of rice paid by INFOP have almost always been below the average market price of rice. The effectiveness of INFOP's rice price support program is subject to question. It may have been of benefit to some farmers forced to sell their rice during harvest time but does not appear to be an important factor in increasing rice production during the 1960's. The program appears to have been of the most benefit to the mills authorized as agents of INFOP.

Unofficial information suggests that from four to eight thousand tons of rice move from Guatemala to Honduras and El Salvador during the harvest season. Much of this rice reportedly returns to Guatemala when prices are higher. These movements are not shown in the official import-export statistics but the location of the rice production areas in Guatemala is such that the official statistics probably underestimate actual movements of rice. It has been suggested that additional storage facilities for rice in Guatemala would help to prevent such movements. The magnitude of the problem is relatively small. An additional two to three thousand metric tons of storage capacity should be sufficient to handle the rice reportedly exported and reimported. If these storage facilities were divided between, say 10 of the 36 mills, this would add about 300 metric tons to each of their facilities. An average of about 500 metric tons of new storage and drying facilities for rice will also be needed each year during the 1970's to handle projected increases in rice production. A substantial part of these facilities will be needed in the department of Izabal if rice production continues to increase as rapidly in this area as it has in recent years. These facilities could be operated

by farmers' cooperatives or serve as holding facilities for the rice mills located in Guatemala City. If operated by farmers' cooperatives such storage facilities will probably have to eventually add milling facilities and a wholesale distribution outlet for milled rice in Guatemala City if they are to obtain the most favorable prices for their rice.

7.2.2. Wheat

Wheat has been cultivated in Guatemala since the 17th century. At the present time production is concentrated in the Western Sierra region. (See Table 7.3) Interest in increasing wheat production in Guatemala has been evident since 1947.¹ The government initiated a small program to promote wheat production in 1952. Although it was able to demonstrate that wheat yields could be increased, national production continued to decline between 1952 and 1958. (See Table 5.5.)²

Among the major public agencies presently involved in various aspects of promoting wheat production are:

1. Ministerio de Agricultura,
2. Servicio Cooperativo Interamericano del Credito Agrícola Supervisado (SCICAS),
3. Instituto de Fomento de la Producción (INFOP),
4. Banco de Guatemala,
5. Gremial Nacional de Productores de Trigo.

The Ministerio de Agricultura has been concerned with research,

¹ Análisis de la Economía del Trigo en la Republica de Guatemala, 1947.

² The best study presently available on how wheat is grown and marketed in Guatemala is entitled Investigación Sobre el Cultivo del Trigo en Guatemala. This study presents the results of a large survey taken in 1964 by the Dirección General de Estadística of the Ministerio de Economía.

TABLE 7-3
DISTRIBUTION OF WHEAT PRODUCTION BY DEPARTMENT

Department	Per Cent of Total Production
Quezaltenango	39.7
San Marcos	18.0
Totonicapán	14.2
Chimaltenango	12.2
Huehuetenango	7.9
Sololá	6.4
Others	1.6
TOTAL	100.0

extension and seed multiplication programs for wheat.³ SCICAS is primarily concerned with providing credit to wheat farmers. INFOP participates in the marketing of wheat. The Banco de Guatemala finances INFOP's purchasing operations. INFOP's relative importance in the domestic market for wheat has declined since 1959. INFOP is also involved with imported wheat.

³For further information see the report, "Programa Quinquenal de Fomento del Trigo," Misión Conjunta de Programación Para Centro America, October, 1965.

The key group in the present wheat promotion program is the Gremial Nacional de Productores de Trigo. The Gremial is an autonomous public agency responsible for:

- a. protecting the interest of wheat producers,
- b. increasing wheat production,
- c. improving the quality of wheat grown in Guatemala, and
- d. obtaining favorable prices for wheat producers.

To accomplish these goals, the Gremial can construct storage facilities, offer credit, carry on research and extension in all aspects of wheat production and collect basic statistics on wheat. The Gremial is financed by a Q 0.10 tax paid on each 100 pounds of domestic and imported wheat. At the present time the Gremial is primarily concerned with assuring that the wheat producers have access to good seed, fertilizers and credit. The Gremial is usually considered to have been fairly successful in achieving its goals.

The price of domestically produced wheat is fixed at Q 6.00 per 100 lbs. Flour millers are required to buy one ton of domestic wheat for every two tons of imported wheat.

The government's pricing program for wheat appears to have worked reasonably well. There are several reasons for this. To begin with most of the wheat products consumed in Guatemala are purchased by persons with above average incomes. Thus the price of wheat products is not a serious political issue. The high support price of wheat is therefore basically a "bread tax" which transfers income from urban consumers to wheat growers.⁴ Secondly, the price program is relatively

⁴The domestic price is "high" relative to the world price of wheat but not necessarily "high" relative to the cost of production.

TABLE 7-4
LOCATION OF FLOUR MILLS IN GUATEMALA, 1965

Location	Number
Quezaltenango	6
Guatemala City	4
Chimaltenango	2
Totonicapán	2
Huehuetenango	2
San Marcos	1
El Quiché	1
Sololá	1
TOTAL	19

Source: Luis Felípe Escobar Colindres, Soluciones Prácticas al Problema de la Comercialización de Granos Básicos en Guatemala, Thesis, Universidad de San Carlos de Guatemala, September, 1966.

easy to administer because there are only 19 commercial wheat mills with which the government has to deal and it does not have to collect or pay out any money to maintain the support price. (See Table 7-4.)

Finally, and most importantly, Guatemala has to import about two-thirds of its wheat. The high proportion of imports allows the flour mills to

maintain a lower average price for flour than would otherwise be possible. This in turn allows the government to maintain a somewhat higher farm price for wheat than would otherwise be possible.

It would not appear to be desirable for Guatemala to attempt to become self-sufficient in wheat production. To begin with, Guatemala produces only soft wheat. Thus, even if it produced enough wheat to cover domestic consumption in terms of volume it would have to export soft wheat and import hard wheat. This would either force the domestic price of wheat down to the world price or require the government to subsidize wheat producers or exports--neither alternative is likely to be popular. Secondly, a program to substantially increase wheat production at the present time would tend to increase corn prices as land shifted from corn to wheat production. Finally, more storage capacity would be required to handle a given volume of domestic production than would be required to handle the same volume of imported wheat. Most of the wheat in Guatemala is harvested during the six month period from September to February. Thus, if Guatemala were able to be self-sufficient in wheat production it would have to have about 4,000 tons of storage capacity for each 10,000 tons of production. Imports can be scheduled in order to achieve turnover rates of five to ten times a year. Thus imported wheat requires only 1,000 to 2,000 tons of storage capacity for each 10,000 tons of wheat consumed.

If Guatemala is to continue to produce at least one-third of its wheat, it will have to continue its efforts to increase wheat production. These efforts should be concentrated on increasing wheat yields. This will require increased availability of credit for fertilizer and other improved inputs, an increase in the availability of improved seeds and a

continuous research program for wheat. Some additional investment will be needed within the next several years in seed processing facilities and wheat storage. The Ministerio de Agricultura has developed proposals for increasing the nation's seed processing capacity. Private wheat dealers should be able to provide the necessary increases in storage facilities for wheat.

7.2.3. Corn

Corn is grown extensively throughout Guatemala but two major production regions account for nearly 65 per cent of the total production. The western sierra departments of San Marcos, Quezaltenango, Totonicapán, Sololá, Huchuetenango and El Quiché constitute the traditional production region accounted for about 30 per cent of total corn production in 1963. (Table 7.5) Corn production on the south coast has increased rapidly during the past ten years. The three south coast departments of Escuintla, Suchitepéquez and Retalhuleu accounted for nearly 35 per cent of total corn production in 1963. The average percentage of corn production by zone during the 1960-1965 period are shown in Figure 7.1.

Corn production on the south coast is more mechanized than in the western sierra region. The more level terrain and larger farms on the south coast coupled with government programs to promote the use of machinery are the key factors accounted for the higher degree of mechanization.

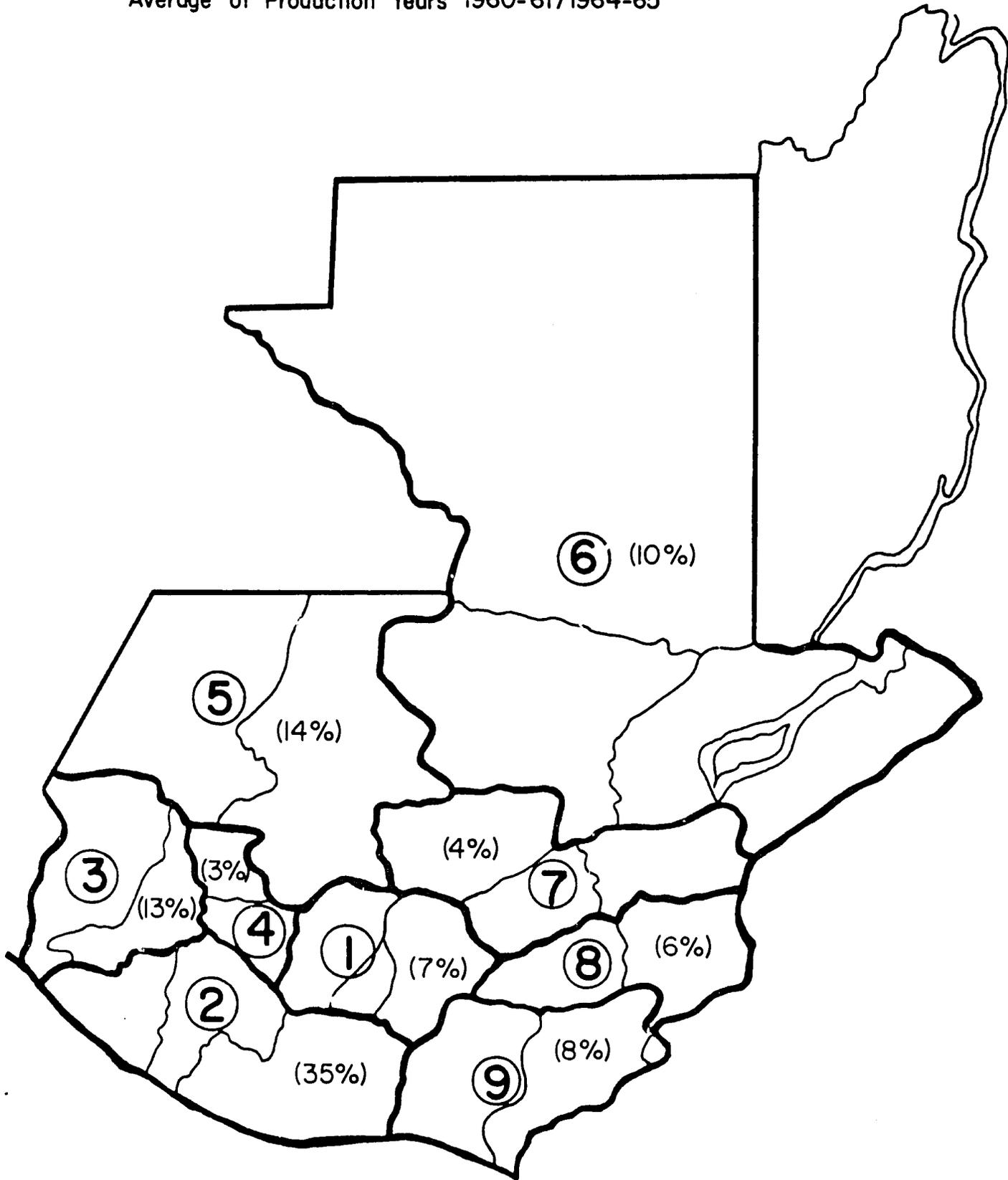
About 75 per cent of the corn produced in Guatemala is for human consumption. Of the remaining 25 per cent; about 15 per cent is fed to hogs, 8 per cent used in chicken feeds and 2 per cent for seed. Most of the hogs produced in Guatemala are grown by farm workers and Indian farmers. Thus much of the corn reportedly used for hog production is probably

TABLE 7-5
 PER CENT OF TOTAL CORN PRODUCTION BY DEPARTMENT
 1962-1963

Zone	Department	Per Cent of Total Corn Production 1962-1963	
1. Central		<u>7.0</u>	
	Chimaltenango		3.7
	Guatemala		2.6
	Sacatepéquez		0.7
2. Sur		<u>34.5</u>	
	Escuintla		12.8
	Suchitepéquez		17.0
	Retaluleu		4.8
3. Occidental		<u>13.8</u>	
	San Marcos		7.2
	Quezaltenango		6.6
4. Occidental Media		<u>3.5</u>	
	Totonicapán		1.7
	Sololá		1.8
5. Nor Occidental		<u>13.2</u>	
	Huehuetenango		7.6
	El Quiché		5.6
6. Norte		<u>9.5</u>	
	El Petén		1.0
	Alta Verapaz		6.3
	Izabal		2.2
7. Nor Oriental		<u>4.7</u>	
	Baja Verapaz		2.6
	El Progreso		0.7
	Zacapa		1.4
8. Oriental		<u>6.0</u>	
	Jalapa		2.9
	Chiquimula		3.1
9. Sur Oriental		<u>7.7</u>	
	Santa Rosa		3.7
	Jutiapa		4.0
TOTAL		100.0	

Figure 7.1 Percentage of Corn Production by Zone

Average of Production Years 1960-61/1964-65



Source: Direccion General de Estadistica, Guatemala

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low quality or spoiled corn which would usually not be used for human consumption and can not be marketed. A substantial part of the corn used in chicken feeds, on the other hand, is processed by the commercial feed mills in Guatemala City. Most of this corn comes from the departments of Escuintla and Suchitepéquez.

Given the importance of corn in the diets of Guatemalans and the production programs of most farmers it is surprising how little information is available on corn marketing in Guatemala. There is far more reliable information on wheat production and marketing than on corn even though nearly 20 times as much corn is produced in the country as wheat. There is no reliable information, for example, on the amount of corn that moves through different marketing channels. About all one can say is that the marketing system for corn varies somewhat between regions depending on the roads and type of farming in the regions. Truckers play an important role in the commercialization of corn in some parts of the country. They usually buy directly from farmers at harvest time and resell the corn almost immediately to wholesalers in deficit areas. In the western sierra region, however, many Indian farmers apparently market much of their own corn directly in the weekly community markets or sell it directly to local wholesalers. Some corn moves into El Salvador during harvest time and returns when wholesale prices have increased. As in the case of rice, official import-export statistics probably underestimate such movements.

The central concern of government officials, wholesalers and farmers is the lack of storage and drying facilities for corn. Government officials are concerned because of the large amounts of corn reportedly wasted due to lack of facilities in the main production regions. Whole-

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salers are concerned because of the shortage of long term credit for constructing such facilities and because of the inadequacies of the laws governing the operation of warehouse facilities. Farmers are concerned because they feel that more storage and drying facilities would mean higher prices at harvest time. Such of the remainder of this chapter will therefore be devoted to an analysis of the storage requirements for corn in Guatemala.

7.3. Regional Corn Balances⁵

A first approximation of the volume of corn entering into commerce-- and hence an idea of the demand for marketing services--can be achieved by estimating the supply and demand for corn at a regional level. Data for 1964 are used because the Agricultural Census of that year provides the most detailed information on supply and demand at regional levels. The 1964 production year can be considered "normal" according to the historical trend. Net imports accounted for a small share (1.6%) of total supply in 1964. The data are compiled for the nine major zones used by the Dirección General de Estadística in its tabulations. Projections for 1970, 1975, and 1980 are based on trends observed in the recent past.

7.3.1. Regional Corn Supply

The 1964 production and regional surpluses and deficits of corn are presented in Table 7.6. The central sierra zones number 1 and 4 are the main deficit regions while zone 2 on the south coast is the only region with a large surplus of corn production.

⁵Much of the material presented in sections 7.3 and 7.4 was prepared by Phillip E. Church in February, 1969.

TABLE 7-6
REGIONAL SURPLUSES OR DEFICITS OF CORN, 1964

Zones	1964 Production (M. T.)	Projected Annual Increase (%)	Estimated ¹ Marketing Losses (%)	Per Capita Consumption (Kg/Yr)	Surplus or (Deficit) (M. T.)
1	50,177	1	9	142	(102,618)
2	271,294	5	14	160	138,670
3	105,437	4	12	171	(12,608)
4	22,784	2	9	171	(23,669)
5	94,829	3	12	171	(12,840)
6	70,684	2	26	108	7,368
7	35,185	2	8	125	(1,458)
8	45,126	4	11	147	2,070
9	54,689	5	9	138	3,110
TOTAL	750,205				

¹Estimated losses given the existing grain storage facilities.

Government efforts with parcelamientos in zone 2 are visible in the zone's 35 per cent share of national output. The extensive Northern Zone (6) which includes the departments of El Petén, Alta Verapaz and Izabal has also experienced a rapid expansion in corn production in recent years. The average annual increase in output for each zone is based on past performance and anticipated development efforts by the national government.

Surveys by the Dirección General de Mercadeo Agropecuario reveal wide differences in marketing losses among production zones depending on available facilities for storage, transport, and processing. In projecting regional production, it is assumed that added output will be accompanied by additional marketing facilities necessary to prevent any increase in loss percentages. Corn set aside for seed is also assumed to remain a constant 2 per cent of output based on past experience.

Projections of regional corn supply for 1970, 1975 and 1980 are presented in Table 7-7.

7.3.2. Regional Corn Demand

Corn consumption patterns vary among indigenous and ladino cultures and between urban and rural populations. From a dietary survey conducted by the INCAP and from estimates of population distribution available in the 1964 census, it is possible to estimate per capita and total corn consumption for each of the nine corn production zones. Abstracting from the consumption effects of possible changes in real income and relative prices, these regional patterns are expected to change very little during the projection period.

Of more interest is the possible shift in consumption demand for

TABLE 7-7
 PROJECTIONS OF EFFECTIVE CORN SUPPLY BY REGIONS

Zone	Effective Corn Supply ^a		
	1970	1975	1980
1. Central	47,314	49,546	51,773
2. Sur	296,125	353,072	410,020
3. Occidental	112,438	130,573	148,708
4. Occidental Media	22,711	24,739	26,766
5. Nor Occidental	96,233	108,466	120,699
6. Norte	56,999	62,088	67,178
7. Nor Oriental	35,467	38,634	41,800
8. Oriental	48,682	56,534	64,385
9. Sur Oriental	63,275	75,442	87,613
TOTALS	779,244	899,094	1,018,942

^aProjections in Tables 7-8, 7-9 and 7-10 were prepared by Phillip E. Church, February, 1969. Losses and corn used for seed are subtracted from gross supply to obtain effective supply.

corn with future population shifts between zones. Zones 1 and 4 with the capitol city and major urban/industrial populations are expected to experience the most rapid expansion of population. The extensive Northern Zone (6) is also likely to undergo more rapid growth if government colonization programs continue at their current pace. Growth rates are based on comparisons of populations by zone from the Census of 1950 and the Census of 1964.

Projections of consumers demand for corn for 1970, 1975, and 1980 are presented in Table 7-8.

7.3.3. The Regional Corn Balance for 1964

Very little information is available on corn movements in Guatemala. The estimated surpluses and deficits shown in Table 7-6 suggest that the major movements from excess (E) to deficit (D) zones are likely to be as illustrated in Figure 7.2.

The total of all the deficit regions is about 25 per cent of the effective corn supply or 20 per cent of total corn production for 1964. As an approximation of the share of corn output reaching markets, however, these figures are probably conservative. Not included, for example, is the industrial demand for corn in these deficit regions. Moreover, intrazonal and intradepartmental trade in both the deficit and surplus regions is excluded.

The market distortions produced by seasonal supply imbalances are also important. During peak harvest periods even the deficit zones have a surplus of corn, which often, for lack of storage, must be marketed at low prices and flows to other zones or into export.

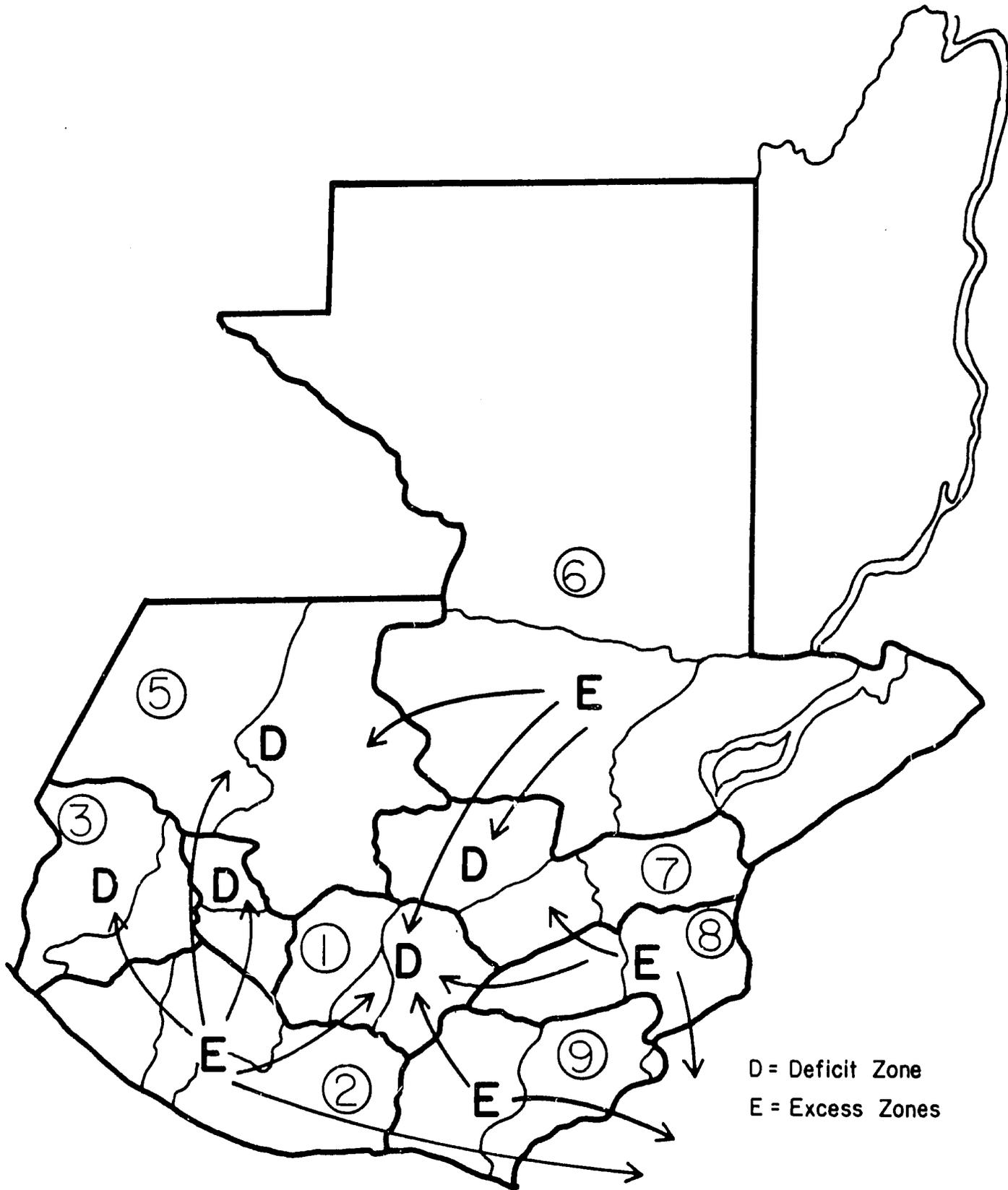
Similarly the surplus zones often market such a large share of

TABLE 7-8
 PROJECTIONS OF CONSUMER DEMAND FOR
 CORN BY REGION

Zone	Consumer Demand for Corn ^a		
	1970	1975	1980
1. Central	187,012	228,244	278,310
2. Sur	118,530	149,722	189,826
3. Occidental	120,842	137,378	156,992
4. Occidental Media	51,418	58,450	66,799
5. Nor Occidental	111,382	128,373	148,195
6. Norte	53,970	64,415	77,037
7. Nor Oriental	38,756	44,056	50,350
8. Oriental	42,398	46,861	52,439
9. Sur Oriental	53,314	60,605	69,263
SUB-TOTAL	777,622	918,104	1,089,211
Industrial Demand	11,902	14,527	17,152
TOTAL	789,524	932,631	1,106,363

^aIncludes direct and indirect.

Figure 7.2 Movement of Corn from Excess to Deficit Zones, 1964



output during harvest periods that they must buy back corn in other seasons. The Eastern and Southeastern Zones, 8 and 9, for example, are strongly influenced by demand and supply conditions in El Salvador, where marketing and storage facilities are more highly developed. In 1964 El Salvador purchased 17.7 metric tons of grain corn from Guatemala, mostly from these two zones. During other seasons of the same year, Guatemala imported from 217.5 metric tons of corn from El Salvador, to satisfy off-season demand for these two southern zones.

7.3.4. Projected Regional Corn Balances

When the supply and demand for corn is projected for 1970, 1975, and 1980, some changes in deficit and surplus patterns are noticeable. Heavy-consuming Zone 1 more than doubles its corn deficit by 1980 and increases its share of the total regional deficit from 67 per cent to 70 per cent. Since Zone 1 is also likely to account for the largest share of industrial corn demand these projections are probably conservative. (Table 7-9)

Population pressures in the major producing region, Southern Zone 2, are likely to cut into the area's surplus. The projections indicate less than a doubling of the zone's surplus by 1980 and a relative decline, as a share of total regional surplus, from 92 per cent to 88 per cent. The other noticeable change in production and consumption patterns is the conversion of Northern Zone 6 from a surplus to a deficit region due to population inflows and limited opportunities for expanded corn production.

According to these projections, the total deficit of all the deficit regions in 1980 will have risen to about 33 per cent of the effective corn

TABLE 7-9
PROJECTED SURPLUSES AND DEFICITS OF CORN BY REGION

Zone	Regional Surplus or (Deficit)		
	1970	1975	1980
1. Central	(139, 698)	(178, 698)	(226, 537)
2. Sur	177, 595	203, 350	220, 194
3. Occidental	(8, 404)	(6, 805)	(8, 284)
4. Occidental Media	(28, 707)	(33, 711)	(40, 033)
5. Nor Occidental	(15, 149)	(19, 907)	(27, 496)
6. Norte	3, 029	(2, 327)	(9, 859)
7. Nor Oriental	(3, 289)	(5, 422)	(8, 550)
8. Oriental	6, 284	9, 673	11, 946
9. Sur Oriental	9, 961	14, 837	18, 350
SUB-TOTAL (net)	+1, 622	(-19, 010)	(-70, 269)
Industrial Demand	11, 902	14, 527	17, 152
Projected Imports ¹	10, 280	33, 537	87, 421

¹Projected imports are based on the assumption that past trends in production and consumption continue during the 1970's.

supply for that year. This is a noticeable 30 per cent increase over the 1964 share of 25 per cent and a good indication of the increased importance of corn marketing in the future. Rural to urban population shifts anticipated within particular departments of Guatemala give every indication that intrazonal corn marketing will experience a similar increase in importance.

In absolute terms, the total of all the deficit zones will be more than double the 1964 figure, indicating that a sizable expansion of marketing services will be necessary just to keep up with current standards. If price stabilization programs are to be improved and current marketing losses diminished, an even larger effort will be required.

7.4. Corn Storage Requirements for 1970 and 1980

Given the available information on corn supply and demand patterns in Guatemala it is possible to estimate current and anticipated storage requirements for efficient marketing operations. Such estimates are based on subjective criteria as well as the technical constraints of the market system. These criteria and constraints are clarified here to aid in the meaningful interpretation of storage needs presented in the accompanying tables.

7.4.1. Existing Storage Facilities

The available statistics on existing storage facilities in Guatemala are extremely sketchy. The information which is available on grain silos is presented in Table 7-10 and summarized in Table 7-11. These estimates of grain storage capacity include:

- a. the facilities operated by INFOP,

TABLE 7-10
THE LOCATION AND CAPACITY OF CORN STORAGE
SILOS FOR CORN^a

Location	Capacity in MT
<u>A. Guatemala</u>	<u>19,440</u>
1. INFOP Silos	11,960
2. Alimentos Mariscal S. A.	5,750
3. Purina de Guatemala	1,380
4. Deposito Santa Ana	230
5. Ricardo Amado	120
<u>B. Jutiapa</u>	<u>3,266</u>
6. INFOP: silos-552, bodegas-138	690
7. Parcelamiento Montufar (in small granaries)	1,656
8. Small granaries	920
<u>C. Santa Rosa</u>	<u>1,104</u>
9. Chiquimulilla--INFOP: silos-552, bodegas-138	690
10. Small granaries	414
<u>D. Escuintla</u>	<u>783</u>
11. La Democracia-INFOP: silos-552, bodegas-138	690
12. Parcelamiento El Cajon (small granaries)	23
13. Parcelamiento Nueva Concepcion (small granaries)	29
14. Parcelamiento El Arisco (granaries)	41
<u>E. Retalhuleu</u>	<u>759</u>
15. INFOP: silos-552, bodegas-138	690
16. Parcelamiento Santa Fe (granaries)	69
<u>F. Suchitepequez</u>	<u>2,903</u>
17. Parcelamiento La Maquina: silos-2,314 granaries-589	2,903
<u>G. Quezaltenango</u>	<u>805</u>
18. San Miguelito (Alfonso Robles)	69
19. Parcelamiento El Reposo (Jose Luis Barillas)	46
20. INFOP: Coatepeque-552, bodegas-138	690
<u>H. San Marcos</u>	<u>28</u>
21. Parcelamiento La Blanca (granaries)	28
<u>I. Huchuetenango</u>	<u>148</u>
22. Santa Cruz Barillas	37
23. San Pedro Necta	46
24. San Sebastian Huista	37
25. Cuilco	28
TOTAL	29,236

^aTable prepared by MA Campos, Ministerio de Agricultura, Guatemala City, February, 1969.

TABLE 7-11
SUMMARY OF GRAIN SILO CAPACITY BY ZONE

Zone	Department	Capacity (MT)
1. Central		19,440
	Guatemala	19,440
2. Sur		4,445
	Escuintla	783
	Suchitepequez	2,903
	Retalhuleu	759
3. Occidental		833
	San Marcos	28
	Quezaltenango	805
4. Occidental Media		- -
5. Nor Occidental		148
	Huehuetenango	148
6. Norte		- -
7. Nor Oriental		- -
8. Oriental		- -
9. Sur Oriental		4,370
	Santa Rosa	1,104
	Jutiapa	3,266
TOTAL		29,236

- b. the capacity reported by grain dealers having grain silos, and
- c. the grain silos or small granaries located on the parcelamientos.

According to these data, only 9 of the 22 departments in Guatemala have grain silo facilities. Two-thirds of the silo capacity reported in these 9 departments is located in Guatemala City. Over 60 per cent of this two-thirds is accounted for by the INFOP silos in Guatemala City which are used to a large extent for storing wheat. The total capacity of grain silo facilities in Guatemala is 29,236 metric tons. INFOP controls nearly 53 per cent of the reported capacity. INFOP's silo facilities outside of Guatemala City account for about 12 per cent of the total grain silo capacity in the country and slightly over 35 per cent of the silo capacity outside of Guatemala City. These facilities have not been used very intensively in recent years.

No reliable information is available on the existing warehouse capacity used for storing grain. The best one can do is to make a judgement estimate based on the limited information available on grain turnover in storage facilities and the percent of corn marketed in various zones.

Assuming an average turnover rate of 3.0, which appears somewhat high for Guatemala, it would require approximately 250,000 metric tons of storage capacity to store the corn presently produced in Guatemala. A substantial part of this capacity requirement would be provided by farmers using a corner of a room in their house to store several sacks of corn and by small retailers with a few sacks of grain in a corner of their store. Our estimates of the amount of warehouse facilities which would

be needed to handle the grain presently produced and marketed within the various zones is presented in Table 7-12. These figures do not represent the actual warehouse capacity that exists in the zones but they suggest that between 100,000 and 130,000 metric tons of commercial grain storage capacity is probably available in the country in addition to the silo capacity reported in Table 7-11. A substantial part of this capacity probably consists of small single room storage units but until a survey of grain warehouse facilities is taken there is no way to determine the extent of such capacity with any degree of certainty.

7.4.2. New Storage Facilities Needed

Given the lack of data on existing storage facilities it is impossible to determine how much new storage capacity is needed to efficiently handle the existing corn production. We can, however, estimate how much new storage capacity will be needed to handle projected increases in corn production. The rough estimates of existing storage capacity presented in section 7.4.1. can be used to estimate the amount of new storage capacity needed to replace existing facilities as they wear out.

Corn comes on the market unevenly during the production year. It is estimated that 88 per cent of total corn production is harvested during the six-month period, August through January. The monthly percentage of corn harvested are presented in Table 7-13. The percentages in Table 7-13 also represent rough estimates of the percentage of corn marketed during the various months. For a given quantity of corn moving into storage according to these percentages and assuming equal monthly drawdowns for consumption, the average turnover rate of the minimum amount of storage capacity needed to handle

TABLE 7-12
WAREHOUSE CAPACITY FOR CORN STORAGE

Zone	Per Cent of Corn Marketed ^a	Warehouse Capacity Estimates ^b
1. Central	65	11,000
2. Sur	80	50,000 ^c
3. Occidental	40	13,000
4. Occidental Media	50	4,000
5. Nor Occidental	40	13,000
6. Norte	50	12,000
7. Nor Oriental	50	6,000
8. Oriental	70	10,000
9. Sur Oriental	70	9,000
TOTAL		128,000

^aData on the percentage of corn marketed in the various zones is not available. These percentages represent assumptions based on discussions with personnel of the Ministry of Agriculture in Guatemala.

^bThese figures are rough estimates of capacity needed to store marketed grain within the region if the average turnover rate is equal to 3. Figures for Zone 2 take into account grain movement to Zone 1.

^cA substantial part of this capacity may in fact be located in Guatemala City.

TABLE 7-13
PER CENT OF CORN HARVESTED AND MARKETED EACH MONTH

Month	Per Cent Harvested and Marketed
January	10
February	2
March	2
April	2
May	2
June	2
July	2
August	12
September	15
October	18
November	18
December	15
TOTAL	100

the grain would be 2.63.⁶ Using an average turnover rate of 3, therefore provides a fairly conservative estimate of the amount of storage capacity needed to handle a given volume of corn production.

Corn production in Guatemala is expected to increase by about 24,000 MT per year during the 1970's. Assuming that, on the average, 75 per cent of this corn enters the marketing system and the average turnover rate of the storage facilities is equal to 3, it will require 6,000 MT of new storage capacity each year to handle the increased corn production. At least another 6,000 MT of new capacity will be needed each year to replace existing facilities as they wear out. The total additional storage

⁶A minimum of 456 MT of capacity, for example, would be needed to handle 1,200 MT of corn. The 456 MT represents the peak inventory level which would occur in January if the percentage of corn marketed each month followed the figures in Table 7-13. The 2.63 turnover rate does not allow for any surplus storage capacity during the peak inventory month.

capacity needed during the 1970's is therefore equal to a minimum 120,000 metric tons. At least one-half of this capacity should be constructed before 1975.

Considering regional grain movements and the percentage of production marketed in the various zones, we would recommend that about 20 per cent of the new capacity be located in Zone 1, 40 per cent in Zone 2 and 11 per cent in Zone 9. The percentages for the other zones are shown in Table 7-14. These percentages serve as rough guidelines as to where new facilities will be needed most to handle production increases. The percentage for Zone 1 has been adjusted upward while the percentage for Zone 2 was adjusted downward to take account of the large movement of corn from Zone 2 to Zone 1 during the harvest season. These percentages are based on the assumption that past production trends will continue during the 1970's. Any large scale program to increase corn production in any particular region of Guatemala would require a revision of the percentages shown in Table 7-14.

Assuming an average cost of Q 90.00 per metric ton of storage capacity and associated equipment, it would cost Q5,400,000 to provide the 60,000 MT of storage capacity needed by 1975. The proposed allocation of this new storage capacity is shown in Table 7-14.

7.4.3. INFOP's Proposed Storage Facilities

The Instituto de Fomento de la Producción (INFOP) was created in 1949 with the primary responsibility for administering the government's price support programs for grains. INFOP is composed of three departments:

TABLE 7-14
 ADDITION GRAIN STORAGE CAPACITY REQUIREMENTS
 FOR 1975 BY ZONE

Zone	Per Cent of New Capacity	Proposed Allocation of Storage Capacity to meet 1975 Requirements (in MT)
1. Central	20	12,000
2. Sur	40	24,000
3. Occidental	9	5,400
4. Occidental Media	2	1,200
5. Nor Occidental	6	3,600
6. Norte	3	1,800
7. Nor Oriental	2	1,200
8. Oriental	7	4,200
9. Sur Oriental	11	6,600
TOTAL	100	60,000

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- (a) Agricultural and Industrial Credit
- (b) Development (Fomento)
- (c) Housing (Vivienda Popular)

The department of Agricultural and Industrial Credit makes medium and short-term loans to farmers, cattlemen and agri-related industries. Money for these loans is obtained from the Banco de Guatemala. The department of Development is responsible for regulating the market for agricultural products. INFOP presently buys and sells some rice and corn for this purpose. The department of Housing is concerned with improving the housing situation of farm workers and extends credit for the construction of new houses.

The initial capital for INFOP was provided by the Banco de Guatemala and the government. The Banco de Guatemala provides INFOP with funds each year to carry out its purchases of grains. Losses are made up by the central government. Profits are placed in reserve funds for the various departments.

INFOP sets minimum wholesale prices each year for rice and corn. The prices vary somewhat depending on the location at which the grain is purchased and the quality of the grain. The grain that INFOP purchases are sold to wholesalers at a markup of about Q 4.40 per metric ton to cover handling and storage costs. No attempt is made to directly regulate the retail price of rice and corn. INFOP does not handle enough grain to effectively control retail prices even if it wanted to. During the 1964-1966 period, for example, INFOP handled less than 2 per cent of the total consumption of basic grains.

INFOP operates a system of silos that consists of a large concrete facility in Guatemala City and five small metal silo facilities located in

corn producing areas. The silo facility in Guatemala City is reported to have handled on the average about 28,850 MT of grain a year during the 1963-1966 period with a resulting annual turnover rate of about 2.4. Part of the grain handled was imported. The turnover rate of this facility during the 1959-1961 period ranged from 0.24 to 1.49 with storage costs ranging from Q 3.71 to Q 21.64 per metric ton.⁷

The silo facilities located outside of Guatemala city had turnover rates ranging from 0.01 to 0.46 during the 1963-1966 period. The average turnover rate of INFOP's small facilities during this period was 0.17. The storage cost per MT of grain handled by INFOP's silo in Guatemala City during 1963-1966 was around Q 3.27 per metric ton. The storage costs for grain handled in the small silos, on the other hand, ranged from Q 25.88 to Q 1,431.00 per metric ton.⁸

Even though INFOP presently makes very little use of its silo facilities in production regions, it has proposed a construction program to increase its grain storage capacity by 31,700 metric tons which is about a 200 per cent increase above existing facilities. The proposed new facilities and estimated costs are presented in Table 7-15. The average cost of the new facilities is estimated to be Q 73.73 per metric ton which is about Q 60.00 per metric ton less than the average cost of new grain storage facilities proposed for other countries in Central America. Using the estimated costs for new storage facilities

⁷See: Los Granos Basicos en Centroamerica y Panama, Volumen II, a report prepared by CEPAL, FAO, SIECA and BCIE for the Reunion de Institutos de Fomento y Estabilizacion de Precios held in Guatemala in May, 1963.

⁸Banco Centroamericano de Integración Economica, Programa Regional de Almacenamiento de Granos Basicos, Tegucigalpa, Honduras, March, 1968. See Table 38-A. The grain storage programs of the Central American countries are presented in this report. An integrated plan is not developed, however.

TABLE 7-15
PROPOSED NEW GRAIN STORAGE CAPACITY FOR INFOP

Location	Capacity (MT)	Total Cost (Quetzales)	Cost Per MT
Quezaltenango	10,000	Q 660,555	Q 66.01
Retalhuleu	10,000	660,555	66.01
Jutiapa	3,900	338,715	86.85
Los Amates	3,900	338,715	86.85
Tactic	3,900	338,715	86.85
TOTAL	31,700	Q2,337,255	Q73.73

Source: ICAITI, "Informe Sobre la Factibilidad de Ampliación de los Silos del INFOP," Guatemala.

provided by the Banco Centroamericano de Integración Económica, the total cost of the new facilities proposed by INFOP would be closer to Q 3,457,000 than INFOP's estimate of Q 2,337,255 total cost.⁹ This represents an average cost of about Q 109 per metric ton of new capacity.

If INFOP were to operate the proposed new facilities at the rate of 1.00 turnover per year, the fixed costs alone would be about Q 10.00 per metric ton of grain stored. At the average turnover rate for regional storage facilities achieved during the 1963-1966 period, the fixed costs would be over Q 54.00 per metric ton.¹⁰ Regardless of how the costs

⁹Banco Centroamericano de Integración Económica, Programa Regional de Almacenamiento de Granos Básicos, Tegucigalpa, Honduras, March, 1968, page 71.

¹⁰Figures based on INFOP's construction cost estimates.

are figured, the fact remains that INFOP will lose substantial amounts of money on the proposed new storage facilities unless it is able to use them much more intensively than it is presently using its existing regional storage facilities. It would therefore seem advisable for INFOP to postpone the construction of new facilities until it is able to operate its existing facilities at a turnover rate of 2.0 or higher.

7.4.4. A Grain Storage Program

With the possible exception of Costa Rica, the existing grain marketing systems in Central America are far from adequate. The International Bank for Reconstruction and Development reported in 1967 that storage capacity as a proportion of total output of rice, beans and corn was 2.6 per cent in Guatemala, 17.5 per cent in El Salvador, 2.8 per cent in Honduras, 3.3 per cent in Nicaragua and 23.0 per cent in Costa Rica.¹¹ The bank was well aware that these percentages tend to understate the actual grain storage capacity in the countries but they do illustrate that Guatemala is far behind El Salvador and Costa Rica in developing a modern grain storage system.

There are several reasons why Guatemala has been slow in developing adequate storage facilities. First, the government has been unwilling or unable to play a sizeable role in the storage and marketing of corn. Second, private grain dealers have been reluctant to construct modern storage facilities because of uncertainty about the government's

¹¹International Bank for Reconstruction and Development, International Development Association, Economic Development and Prospects of Central America, Vol. III, Agriculture, June, 1967, p. 21. The 2.6 per cent figure for Guatemala is based on a 1962 estimate of 17,800 MT of storage capacity and a reported 1965 output of 685,000 MT of corn, rice and beans.

policies on grain speculation. Third, there has been a shortage of long term capital available for the construction of grain storage facilities.

The need for a grain storage program in Guatemala is obvious both to grain dealers and government officials. Equally obvious is the fact that no workable programs have been developed to meet the need. Serious consideration and public discussion needs to be devoted to developing such a storage program within the next year. The outline for a possible grain storage program is presented in this section as a starting point. The program presented is based on the assumption that corn production will continue to increase during the 1970's as it did during the 1950's and 1960's. The program would have to be modified if a large scale program to increase corn production was undertaken.

The first step in the modernization of the grain marketing system in Guatemala is to develop a workable warehouse law for grains. This step is already underway. The banking system will have to develop lending procedures which will make such a law useful to grain dealers. The Ministry of Agriculture will have to improve its market information and price reporting procedures for corn and will have to assist in the development and adoption of an acceptable set of corn grades.

The second step is to determine approximately how much storage is needed and where it should be located. This information is essential for obtaining and allocating funds for the construction of new facilities. We have suggested the need for a five year program designed to increase total storage capacity by 60,000 metric tons by 1975. Broad guideline for the location of the storage facilities are found in Table 7-14. A somewhat more detailed study of corn marketing would be helpful improving these guidelines. The construction of 60,000 metric

storage capacity will require a total investment between Q 4, 500, 000 and Q 5, 500, 000 depending on the type and location of the facilities. Most of the facilities constructed will probably be small metal bin units located in production regions. These units will probably vary in size from as small as 300 to 400 metric tons to as large as 2, 000 to 3, 000 metric tons. Concrete facilities or larger metal bin units may be justified at key population centers on the south coast or in Guatemala City. The small size of most of the units tends to increase the investment cost per metric ton of capacity.

The third step is to decide who is to operate the new storage facilities. This decision depends partly on the price policy adopted by the government. At the present time it would appear appropriate for the government to follow a price policy that will allow private grain dealers and farmers associations to earn a reasonable profit on the operation of new storage units. (A few suggestions along these lines will be made in section 7.5.) Given this type of price policy the bulk of the new facilities should be owned and operated by the private sector.

A warehouse law for grain would create opportunities for monopolizing the grain market which formerly did not exist. Suppose, for example, that the price elasticity for corn is 0.7 and a grain dealer can borrow up to 80 per cent on warehouse receipts. At present prices and production levels it would be possible to increase prices by about 20 per cent by withholding around 100, 000 metric tons of corn from the market. The capital requirement for holding the grain would be around Q 1, 720, 000 if it were possible to borrow up to 80 per cent on the grain being held. If it were not possible to borrow money on grain in storage, the capital required to hold 100, 000 metric tons of grain would be around Q 8, 6

The grain withheld could be used the following year to depress farm prices or could, in some cases, be exported to other Central American countries. The government should be able to control this type of situation fairly easily through limitations on the amount of credit extended to individual grain dealers and through the use of corn imports.

According to our projections, if corn production does not increase as a faster rate in the future than in the past, Guatemala will have to import around 87,000 metric tons of corn by 1980. At the present time, importing corn at world prices and selling at domestic prices would be a fairly profitable business and will probably continue to be so during the 1970's. This suggests that an import facility for grain at Puerto Barrios might prove to be a good investment. Such a facility would handle wheat during the early 1970's and both wheat and corn in the late 1970's. If INFOP were to operate such a facility it could devote more of its grain storage capacity in Guatemala City to corn storage.

A grain storage program for Guatemala could benefit farmers and consumers as well as grain dealers. Additional commercial storage facilities would help to reduce seasonal variations in corn prices in two ways. First, by increasing the competition for the farmers corn at harvest time such facilities would tend to increase the farm price of corn. Second, the reduced losses in new facilities would tend to increase the supply of corn available for human consumption and thereby tend to lower consumer prices. It is estimated that at least 10 to 12 per cent of the corn marketed is lost in the marketing system at the present time. The marketing losses by zone according to our estimates are as follows. With modern storage facilities it should be possible to reduce losses of grain handled by new facilities to at least 4 per cent.

<u>Zone</u>	<u>Per Cent of Corn Lost in Marketing Channels</u>
1	9
2	14
3	12
4	9
5	12
6	26
7	8
8	11
9	9

Assuming that the new facilities were located according to the guidelines presented in Table 7-14, the total amount of grain saved per year would be around 14,500 metric tons. At present prices this grain would be worth over Q 1,245,000. Assuming these savings could be realized for a 15 year period and using an 8 per cent discount rate, the present value of the grain saved during the discount period would be over Q 10,650,000. If the new facilities cost Q 5,400,000, the benefit-cost ratio would be approximately 1.97. This is not a particularly high benefit-cost ratio but it does indicate that investment in the facilities would be definitely worthwhile for the standpoint of the country as a whole.¹²

Loans for the construction of new storage facilities should be at least ten to twelve year loans. Shorter repayment periods for grain storage loans would tend to discourage private investment in such facilities and to make it more difficult for new firms to enter the grain storage business.

It should be stressed that the storage program that has been outlined above is based on the assumption that corn production will increase in the future at the same rate as in the past. With a large scale fertilizer

¹²The benefit-cost ratio presented does not take into account benefits associated with more stable prices, reduced corn imports and reduced labor requirements to handle a given amount of grain. Such factors would tend to increase the benefit-cost ratio.

program such as will be discussed in detail in section 9.4 of Chapter 9, total corn marketed would increase by an additional 100,000 MT per year within two or three years. Approximately 33,000 MT of additional storage capacity would be required to handle this additional corn. The construction of this capacity would add an additional Q 2,970,000 to the cost of the storage program. The location of the facilities to handle the additional production would depend on where the fertilizer program was centered. A large scale fertilizer program centered on the south coast would require the construction of approximately 23,000 MT of new storage in Zones 2 and 9 and 10,000 MT in Zone 1. A fertilizer program focused on the Central Region would require an additional 10,000 MT of storage capacity in Zone 1, 16,000 MT distributed between Zones 3 and 5 and 7,000 MT of new capacity in Zone 6.

7.5. Price Policies for Corn

Our goal in this section is to briefly outline past price movements for corn and to discuss the government's past price policies including the recent Grain Protocol for Central America. We shall then suggest a few changes in price policy which appear advisable at the present time.

7.5.1. Past Price Movements

The wholesale price of corn usually reaches its highest level in July and its lowest level in October during the peak of the harvest season. The average wholesale price of yellow corn during the 1966 to 1968 period, for example, was nearly 40 per cent higher in July than in October. (Table 7-16). A farmer able to hold his corn harvested in October until the following July would have received an average of 29 dollars per metric ton more for his product. This represents an average

TABLE 7-16
AVERAGE WHOLESALE PRICE OF CORN BY MONTH
1966-1968

Month	Yellow Corn		White Corn	
	Price Q/MT	% of Oct. Price	Price Q/MT	% of Oct. Price
January	80	109.6	80	108.1
February	79	108.2	82	110.8
March	88	120.5	92	124.3
April	95	130.1	97	131.1
May	92	126.0	95	128.4
June	96	131.5	97	131.1
July	102	139.7	93	125.7
August	86	117.8	84	113.5
September	77	105.5	76	102.7
October	73	100.0	74	100.0
November	80	109.6	80	108.1
December	81	110.9	81	109.4
AVERAGE	86	- -	86	- -

price increase of about three dollars per month over the ten month storage period. At these prices, most farm storage units would pay for themselves within three to four years.

Average monthly wholesale prices for corn during the 1956-1967 period are presented in Table 7-17. The average wholesale price for corn for the entire period was Q 3.82 per 100 lbs. There was a slight

TABLE 7-17
MONTHLY WHOLESALE PRICES FOR CORN
(Q per 100 lbs)

Month	Year											
	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
January	4.48	4.00	3.63	3.13	3.05	2.67	4.16	4.00	3.62	3.50	3.32	3.30
February	4.17	3.40	3.48	3.23	2.98	2.00	4.50	4.00	3.50	3.50	3.40	3.49
March	4.13	3.48	3.70	3.40	3.25	2.12	5.50	3.50	3.50	4.50	3.76	3.90
April	4.70	4.35	4.20	4.17	3.65	2.55	6.00	3.50	4.50	4.50	3.77	4.36
May	5.02	4.47	4.37	4.32	3.68	3.32	5.15	3.90	4.50	5.50	3.69	4.31
June	4.80	4.41	4.15	4.52	3.25	3.65	5.02	4.00	4.62	5.50	3.29	5.09
July	4.53	4.55	4.87	4.37	3.58	4.70	5.00	4.00	5.07	5.50	3.00	4.97
August	4.40	4.42	4.58	3.40	2.93	4.30	4.55	4.00	4.75	5.50	2.56	4.60
September	3.53	3.60	3.58	2.97	2.50	3.42	3.50	4.00	4.05	3.50	2.40	4.48
October	3.30	3.47	3.22	3.25	1.93	3.40	2.87	3.50	4.00	5.50	2.54	4.17
November	3.63	3.27	3.15	3.25	2.78	4.17	2.87	3.00	4.50	3.50	3.00	4.32
December	3.70	3.67	3.35	2.87	2.00	4.58	3.00	4.00	4.06	3.50	3.02	4.30
AVERAGE	4.20	3.92	3.86	3.57	2.96	3.41	4.34	3.48	4.22	4.50	3.15	4.27

tendency for corn prices to increase during the period. The average price of corn during the first four years of the period was Q 3.89 per 100 lbs. compared to Q 4.03 per 100 lbs. during the 1964 to 1967 period. Thus, the price of corn, like prices of many other commodities in Guatemala, has been remarkably stable during the past ten years.

The guaranteed prices for corn set by INFOP since 1957 have usually been below the average wholesale price. INFOP's corn prices may have been favorable for short periods of time around harvest season but they have usually been about Q 0.50 per 100 lbs. below the annual average and in three years during the eleven year period were over Q 1.30 per 100 lbs. below the market. (Table 7-18) INFOP's apparent inability to buy at the market price could account for its failure to effectively use its silo facilities for corn. This in turn has reduced INFOP's ability to reduce the seasonal variations in corn prices.

7.5.2. The Grain Protocol¹³

The price policy adopted for corn in Guatemala may well be influenced by the Special Protocol on Grains which came into effect for the five Central American countries in mid-1966. This agreement eliminated the tariffs and quantitative barriers on trade in grains between the countries, except for corn movements between El Salvador and Nicaragua. Thus the five countries now have virtually a free trade area in grain except for wheat and flour for which the local flour mills strongly supported the maintenance of protected national markets. While the common external tariff on grain imports is fairly high, most grain

¹³For additional information on the Protocol see: International Bank for Reconstruction and Development, International Development Association, Economic Development and Prospects of Central America, Vol. III, Agriculture, June, 1967, p. 22.

TABLE 7-18
 INFOP'S GUARANTEED PRICES FOR CORN

Year	Central Silo	Regional Silos	Difference Between INFOP's Central Silo Price and Ave. Wholesale Price
1957	3.50	3.30	-0.42
1958	4.00	--	+0.14
1959	3.00	--	-0.57
1960	3.10	2.90	+0.14
1961	--	--	--
1962	2.00	--	-2.34
1963	2.50	--	-0.98
1964	2.90	2.65	-1.32
1965	3.00	2.75	-1.50
1966	3.25	3.00	+0.10
1967	3.75	3.75	-0.52
1968	3.75	3.75	--

Source: 1957-1966: Luis Felipe Escobar Colindres, Soluciones Prácticas al Problema de la Comercialización de Granos en Guatemala, September, 1966.

1967-1968: INFOP.

imported from outside of Central America is handled by state grain boards which are exempt from the payment of duties. INFOP performs this role in Guatemala.

The key provision of the grain Protocol is that each grain board must give first priority, in meeting shortfalls, to imports from other Central American countries. Imports from the outside can only be made after consultation with the other countries and will have to pay a duty equal to the difference between the import price and the official internal support price. The main purpose of the Protocol is thus to provide an incentive for the Central American countries as a whole to remain self-sufficient in grain production except for wheat.

The coordinating commission for the Protocol has yet to establish a clear-cut long-run price policy for the Central American area. Thus, while the Protocol tends to limit the actions that can be taken by the Central American countries with respect to price policies, the various governments still have a great deal of flexibility in deciding on the type of price policies which they will follow.

7.5.3. Price Policy Suggestions

Our interpretation of INFOP's past price policies is that it has attempted to set a floor on corn prices but has not been especially interested in reducing seasonal price variations. It could have used a more flexible price policy which would have resulted in a higher average floor price while at the same time reducing seasonal price variations. INFOP, however, does not have enough storage capacity to reduce substantially the average wholesale price of corn and therefore probably couldn't have reduced seasonal price variations to any great extent even

if it had wanted to. Assuming a price elasticity of 0.7 and the use of about 50 per cent of its Guatemala City capacity for corn, INFOP would normally be able to alter the average wholesale price by about four to five per cent during the year by effectively using its facilities for the purchase and sale of domestic corn. A somewhat larger effect on prices could be obtained through importing, or threatening to import, corn from outside of Central America.

It would appear desirable for INFOP to become a more aggressive competitor in the corn market during the next several years. By buying and selling corn at the going market price INFOP should be able to provide storage capacity which is not now being used while at the same time earning a profit which could be earmarked for the construction of new facilities. This flexible price policy which adds additional competition to the market should also tend to increase farm prices and reduce seasonal variation in corn prices to some extent. Once INFOP has effectively demonstrated its ability to profitably use its existing facilities, it should begin adding some storage capacity at key locations. We have already suggested that the greatest need for new capacity is on the south coast and that an import facility in the Puerto Barrios area might prove both useful and profitable if efficiently operated by INFOP.

Any price policy designed to eliminate seasonal price variations completely would not be desirable because a certain degree of price variation is needed during the year to encourage investment in storage facilities. Thus it would seem advisable for the government to allow the wholesale price of corn to experience an average increase of at least Q 1.00 per metric ton per month between corn harvests. An average annual price change of Q 14 to Q 15 per metric tons would still be only

one-half as large as seasonal price variations in recent years.

Any effort on the part of the government to substantially increase the farm price of corn as part of a corn production program would not appear advisable. To begin with the government does not control enough storage capacity to support such an effort. Secondly, even if the storage capacity was available, it would be a tremendously expensive and potentially wasteful program. Third, corn prices in Guatemala are already very high relative to world prices. Fourth, the program would not benefit consumers and may be of only short-run benefit to farmers. Fifth, high support prices for corn would discourage farmers from diversifying into other crops. Sixth, higher prices for corn would encourage farmers to shift out of wheat, rice or bean production and thereby create new problems.

Any effort to substantially increase corn production should concentrate on increasing output per unit of land and should be supplemented by a program to minimize reductions in the farm price of corn. INFOP's active participation in the corn market would help prevent price declines to some extent. The storage program outlined in section 7.4.4. could play an even more important role in the government's efforts to prevent a decline in the farm price of corn.

CHAPTER 8

THE MARKETING OF BASIC FOODS

8.1. Government Food Marketing Policies

The Guatemalan government's basic policy is to leave the marketing of food products to private individuals. It does, however, attempt to limit their actions in some ways. It controls beef exports to some extent and sets the maximum retail price for certain cuts of meat. It sets the retail price of pasteurized milk. It inspects imported food products as part of its disease control program. It attempts to assure that only healthy animals are processed and sold by slaughter houses. It sets a minimum price for wheat and buys and sells some corn.

The government provides the food marketing sector with a limited amount of assistance. Part of the price information collected is distributed eventually to farmers and wholesalers but seldom quickly enough to be of much value. Market outlook information is available occasionally in special reports. Some work is being done on establishing grades and standards for a few food products. Various government agencies have, from time to time, developed plans for investments in food marketing facilities. Very few of these plans have been implemented, however, because the planners have been unable to demonstrate to lending agencies that the investments were in fact bankable. The government's cooperation in the Central American Common

Market has facilitated the exportation of a number of food products, especially vegetables. The construction of new roads and the improvement of old ones has undoubtedly helped to cut transportation costs and increase the size of the market open to farmers in many parts of Guatemala.

In general, the Guatemalan government appears to have been very rational in selecting which aspects of food marketing it will attempt to regulate and the methods of control. The technology and consumption patterns of the wheat industry, for example, are such that the government can exercise a good deal of control over the price of wheat. The situation is completely different in the case of corn and the government has limited its actions to a small purchase, storage and import program. The government appears to have weighted the foreign exchange earnings from beef exports more heavily than resulting higher retail prices of beef. It has therefore made limited use of its power to control beef exports. This is indeed a rational decision in light of its apparent goals.

The government's ability to control various aspects of food marketing will probably continue to be nearly as limited in the future as they have been in the past. Whether it will use its limited resources any differently in the future will depend partly on how its goals change. A few predictions and recommendations along these lines will be made after a brief review of the present production and marketing situation for several of the more important food products. Grain marketing is discussed in detail in Chapter 7 and therefore will not be considered in this chapter. The marketing systems for the main export crops--cotton, coffee, bananas and sugar cane--appear to be relatively efficient and will not be discussed in this chapter.

8.2. Vegetables

The geographic and climatic variations in Guatemala allow the production of a wide variety of vegetables. Its lowland valleys and coastal plains are ideal for irrigated winter production of warm season vegetables. Irrigated highland areas of 3,000 to 6,000 feet elevation produce three to four cool season crops per year. In highland areas between 6,000 and 9,000 feet it is possible to produce cool season crops eight months of the year.

8.2.1. Production Areas

The major vegetable producing areas of Guatemala can be classified into three general groups by temperature:

1. Tropical (0 to 3,000 feet)
2. Sub-tropical (3,000 to 6,000 feet)
3. Cool (6,000 to 9,000 feet)¹

Tropical

The Teculután and Zacapa areas in the Motagua River valley has the hottest and driest climate in Central America. It has the largest vegetable producing area in Guatemala and accounts for most of the tomato, cucumber and pepper production in the country. This area is also well suited to the production of onions, melons, eggplant and okra.

¹ Much of the material presented in this section is a summary of Charles Atlee's USAID report entitled "Vegetable Production in Guatemala," January, 1968. Other USAID reports on vegetables include:

- (a) Edward E. Gallahue, "Marketing of Fresh Fruits and Vegetables in Guatemala," 1964;
- (b) George K. Jenner, "Processing of Fruits, Vegetables and Related Data," 1964;
- (c) Robert Pearl, "A Study of the Technical Development of the Guatemalan Fruit and Vegetable Processing Industry," 1965.

The areas around Jocotán in the department of Chiquimula and around Laguna de Retana, Asunción Mita and Atescatempa in the department of Jutiapa also are well suited for the production of onions, tomatoes and peppers. These areas are well located with respect to the market in El Salvador.

Sub-Tropical

A wide variety of irrigated vegetables for local consumption and export are produced in the areas around Guatemala City, Amatitlán and Villa Nueva. Water is limited and land is expensive in these areas but they do have a locational advantage when it comes to marketing green leafy vegetables and strawberries.

The Antigua area has been a vegetable producing area for over four hundred years and supplies a wide variety of good quality vegetables to both the Antigua and Guatemala City markets. Palencia is the chayote and husk tomato producing center of the country. Some green beans, potatoes, cabbage and cauliflower are also grown in this area. About 80 per cent of the garlic grown in Guatemala comes from the Aguacatán valley in Huehuetenango. Much of the garlic is exported to other Central American countries.

Cool

Onions, beets, cabbage, carrots, cauliflower, lettuce, celery, potatoes and radishes are the most important vegetables grown in the Quezaltenango area. Much of the vegetable production in this area is carried out on small family plots averaging about one-tenth of an acre.

Cabbage, cauliflower, lettuce, peas, beans and squash are the most important vegetables grown in the San Lucas-Milpas Altas area.

Potatoes are the major vegetable grown in the Chimaltenango-Tecpán area. Onions, strawberries, tomatoes, cabbage and garlic are the most important vegetables grown in the Sololá area.

8.2.2. Domestic Marketing

Tomatoes are the most important vegetable for processing in Guatemala. Approximately 16,000 tons of tomatoes were processed during the 1966-1967 season. About 80 per cent of these tomatoes were supplied to the four main processing firms by the Teculután Tomato Cooperative.²

Peppers and peas are also processed on a limited scale in Guatemala.

The market for fresh vegetables in Guatemala has historically been characterized by wide variations in prices due to fluctuations in the supplies of vegetables. These fluctuations have been reduced somewhat in recent years due to improvements in market news reporting, storage facilities, processing facilities, and the transportation system. The increase in irrigated acreage has also helped by allowing year-round production of some vegetables.³

When harvested, most vegetables are usually washed and packed into rope nets that pull together at the top with a draw string. These bundles are then carried to the road where they are picked up by bus or truck and taken to the market. Produce may pass through three or

²The two largest firms, Kerns and Ducal, are owned by Grace Lines. Del Monte brand foods are processed, under license, by Sharp.

³See the Appendix for data on the wholesale prices of selected vegetables in recent years.

four middlemen between producer and consumer. There is almost no grading of vegetables except for some unofficial grading of a few crops such as garlic and potatoes. Grading at an early stage in the marketing process may have little value anyway because of careless handling procedures used at most points where products are loaded and unloaded. Except for tomatoes most vegetables are not packed in suitable standardized containers. Very few vegetables are stored in Guatemala except for some potatoes, garlic, onions and squash. Potatoes are seldom stored for more than three to four months.

8.2.3. Export Possibilities for Vegetables

There seems to be general agreement that Guatemala has the potential to profitably export vegetables to the United States. Manassero, in his final report to AID-Guatemala listed tomatoes, sweet peppers, cucumbers, garlic, okra, melons and pineapples as the commodities having the most potential.⁴ There is some production of most of these products during the November to February period when prices are usually high in the United States market. Exportation costs for these products range from about 8 to 17 cents a pound. (See Table 8-1.) The price data provided by Manassero suggest that prices in the New Orleans market during 1966-1967 were high enough to allow exporters to earn a profit on several commodities if they could have delivered high quality produce when wholesale prices in New Orleans were near their peak. Margins would have been largest on garlic, tomatoes and okra. Exportation of onions to the United States would

⁴Final report of James R. Manassero, USAID-Guatemala, August, 1967.

TABLE 8-1
WHOLESALE PRICES FOR SELECTED VEGETABLES
IN NEW ORLEANS

Product	Per Pound Cost of Exportation ¹ (cents)	Wholesale Price in New Orleans: 1966-1967		
		Highest Price (cents/lb)	Month	Price During Harvest Season in Guatemala (cents/lb)
Eggplant	8.6	15.0	June	11.0
Cantaloupes	9.8	18.0	Mar.	--
Tomatoes	13.0	30.0	Dec.	25.0
Watermelons	8.9	15.0	Feb.	--
Cucumbers	9.7	19.0	Mar.	15.0
Sweet Peppers	11.3	35.0	Apr.	18.0
Onions	7.9	8.5	Feb.	7.0
Pineapples	7.3	12.0	Dec.	--
Okra	17.1	35.0	Apr.	25.0
Garlic	13.5	59.0	Mar.	50.0

Source: Final Report of James R. Manassero, USAID Report, Guatemala, August, 1967.

¹Export costs include: Sales Commission, Duty, Brokerage fees, Transportation, Cartons, Handling, Preparation for shipment.

probably not have been profitable even if top prices were received.

It seems rather doubtful that Guatemala will be able to export vegetables to the United States on a large scale within the next five years. To begin with, the transportation, either by air or sea, is not as dependable as needed. Secondly, production and marketing procedures will need to be developed to assure that only top quality vegetables are shipped and that they are harvested at the right time for export purposes. This will probably prove to be a very slow job.

At the present time most vegetable exports are to other Central American countries, especially El Salvador. Potatoes, cabbage, garlic, onions, tomatoes, lettuce, and carrots are the most important export crops. Cool season vegetables are in greatest demand because they are difficult to produce in many parts of Central America. The prospects for increasing vegetable exports to other Central American countries appear to be very promising. The government should continue to give considerable attention to trade agreements and procedures that will facilitate such exports.

8.2.4. Major Problems Facing the Vegetable Industry

Poor quality and high production costs are two of the most important factors limiting the opportunities for increased vegetable exports and processing. Atlee reports that, in spite of inexpensive hand labor, the cost per pound of vegetables at harvest is often higher than in the United States. He attributes this to the fact that many growers still do not know how to use fertilizer, insecticides and fungicides effectively. Furthermore, cultivation practices are frequently very crude and irrigation water is often used improperly.

Very little research data exists on vegetable production in Guatemala. There is a lack of knowledge of which varieties are best to plant in different zones at different times of the year. Little is known about the most effective ways to control insects and diseases under Guatemalan conditions. Only limited data is available on the cost of producing vegetables in various parts of the country. Such cost studies would be useful to banks making loans for vegetable production and to the producers when attempting to estimate the profitability of vegetable production.

There are very few well trained technicians in the field of vegetable production in Guatemala. Many vegetable producing areas have no extension agents capable of providing technical assistance to vegetable growers. The Bárcena School is gradually helping to improve this situation.

There are few reliable statistics related to acreage, production, exports and prices of vegetables in Guatemala. Supply and demand studies based on available data must be interpreted with considerable care. The possibility of providing vegetable producers with either market or outlook information appears very limited given the existing data collection system. A small program to provide producers with outlook information and to keep them posted on export possibilities should be undertaken after the system for collecting agricultural statistics is improved.

Vegetable production in Guatemala will probably increase as rapidly during the next five years as it has in the past five years. (See Table 5-12 for projected increases.) A continued research and extension program for vegetables will be needed. Such programs

should continue to emphasize the production of high quality vegetables and the introduction of improved farming practices that will increase yields and lower costs.

8.3. Fruits

There are at least three agencies of the Ministry of Agriculture engaged in developing the fruit industry in Guatemala. These are the Dirección General de Desarrollo Agropecuario, the Dirección General de Investigación y Extensión Agrícola (DGIEA) and the Dirección General de Mercadeo Agropecuario. The Banco de Guatemala, the Coffee Association, FAO and a number of other public and semi-public agencies are also interested in the development of fruit production in Guatemala.⁵

In general, the Dirección General de Desarrollo Agropecuario is responsible for supplying prospective fruit growers with planting stock and helping them to arrange credit. DGIEA is charged with doing the research work required to select the best varieties of fruit for Guatemala and to develop appropriate orchard practices. The Dirección General de Mercadeo Agropecuario is responsible for conducting research designed to improve the efficiency of fruit marketing and to increase the profitability of fruit production.

The government has carried out a number of studies of the marketing channels for fruit and has proposed the construction of several marketing centers and storage facilities which it believes will encourage

⁵Much of the material presented here on fruit production is drawn from the work of Dr. R. M. Vorhies and especially his USAID report on Fruit Production in Guatemala, July, 1967.

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fruit production.⁶ No detailed proposals for new marketing facilities have been developed however. Thus there is no indication as to whether or not the new facilities would be profitable. The government's main emphasis has been directed toward encouraging farmers to produce more fruit on a commercial scale. There is a general awareness that new marketing facilities for fruit will not be required until five to seven years after farmers have begun to develop commercial orchards.

The FAO and the Asociación Nacional del Café have a joint program for the replacement of marginal coffee acreage with citrus, mangoes and other fruit crops. Dairying, tea production and oil palms are also being considered for some coffee producing areas. According to the FAO studies dairying would produce about the same gross output per hectare as coffee production while tea, oranges or oil palm would more than double gross output. Considering employment, a substitution of coffee by oil palm or oranges would bring no change while tea would employ about three times as much hand labor as coffee. Dairying would require only about 20 per cent of the men previously employed in coffee production. The number of years to breakeven would be 5-6 years on a new coffee plantation vs. 7 years for dairying and oranges, 10 years for oil palm and 11 years for tea.⁷

It appears likely that coffee producers will move slowly into some

⁶For further details see the report of the Ministerio de Agricultura and the Banco de Guatemala entitled, "Proyecto Para el Fomento Frutales Deciduos en el Altiplano," 1967.

⁷Preliminary estimates are based on FAO studies.

of these products. The FAO's orange project will probably be of most interest to coffee farmers because it requires relatively little change in their operations and prices are presently favorable. It seems unlikely that coffee farmers will move into citrus fruit production on a large enough scale to create serious marketing problems. It should be relatively easy for the coffee producers' association to keep track of the citrus fruit acreage. With such information it would be possible to anticipate marketing problems and to take steps to solve them before they actually occur.

There appears to be adequate information on the varieties of oranges that will do well in Guatemala. Washington navel oranges are grown in the highland regions and appear to do well between 3,000 and 5,000 feet. Some variations do well on the South Coast between 1,500 and 2,000 feet.

Although the domestic demand for oranges is expected to be fairly strong, there is an element of risk involved in FAO's orange project due to the uncertainty about the Central American market for oranges during the next 10 years. Large citrus plantings have already been carried out in Central America and others are being planned. Thus the possibilities for exporting oranges appear limited.

Apples are the most important temperate zone fruit grown in Guatemala. Production of apples is presently below domestic demand. Apples are grown throughout the highland region with the greatest production in the Quezaltenango area. The best altitude for apples appears to be between 7,000 and 8,000 feet. One of the problems of establishing orchards at this altitude is supplying enough irrigation water during the dry season for the first few years until the root systems are

established. There is still some debate as to what are the best apple varieties for Guatemala.

The major pear growing area is in the Department of Chimaltenango near the towns of San Lucas and San Bartolomé. Quite a few pears are also grown near Cantel in the Department of Quezaltenango. Pears are usually better suited to lower altitudes than apples. Pear nectar is canned domestically. There is some interest in canning pear halves and fruit cocktail using domestically produced pears. There is a small domestic market for fresh pears but local pears are not very good for fresh eating. Little or no information is available yet on the possibility of growing Bartlett pears commercially in Guatemala.

There are a few commercial plantings of peaches in Guatemala. Most local peaches are very small white fleshed types. Yellow cling peaches are needed for canning fruit cocktail and peach halves. There should be no problem in marketing good yellow peaches in Guatemala. The main problem at the present time appears to be the lack of information on suitable varieties.

Plums have been grown in Guatemala for a long time. The size of local plums is frequently small and the domestic demand is fairly weak. The quality of local plums appears to be the main factor limiting export to other Central American markets.

The potential for increasing production of other deciduous fruits in Guatemala appears limited. Sweet cherries do not seem to be well suited because of lack of winter chilling and the brown rot problem. Apricots are seriously affected by brown rot. Figs seem to do well in the middle elevations but very little information is available on the

possibility of establishing a dried fig industry. There is some production of persimmons but the market appears limited.

Bushberries of several types are being grown in both commercial and backyard plantings. The domestic market appears limited but some could probably be exported to other Central American countries as jams and jellies. Strawberries are grown on a limited scale around Lake Atitlán and Lake Amatitlán. The size of the fruit is small and yields have been low, however. The demand for good strawberries both domestically and for export appears good but there is little research available on which varieties are suitable. Grapes appear to do poorly in most areas of Guatemala. There is a market for grapes but there is very little information on whether or not new varieties can be grown successfully.

It appears that it may be possible to grow cashews on a small scale on the South Coast. There is little information on the possibilities of producing most other types of nuts however.

Many types of wild or semi-wild citrus trees are found in Guatemala. Oranges are grown successfully and presently enjoy a good market. Tangerines are grown widely and are popular in the domestic market. Lemons and limes are grown on a small scale. The possibility of exporting some limes looks promising but commercial production is still limited. There is some scattered production of grapefruit in Guatemala. Quality of the present product is frequently poor. There is a limited domestic market for good quality grapefruit.

Guatemala is a native home of one of the three races of avocados. Much of the domestic production is of poor quality, however. Export of avocados to the United States has been prevented by the seed weevil

quarantine. A good deal of research will be needed to increase the quality of the crop.

Mangoes grow wild throughout Guatemala up to about 4,000 feet elevation. Fruit flies are a problem in some areas. Additional research is needed on varieties. The commercial production of mangoes may be possible especially if varieties could be introduced that ripen before or after the Florida mid-summer mango harvest.

Pineapple is grown throughout the warmer regions of Guatemala. Attempts to grow pineapple on a large scale have not been entirely successful to date but the development of new varieties and new production techniques may alter this situation in the future.

Commercial production of papaya has not been very successful in the past and there is little evidence to suggest that it will be in the future.

Coconuts are grown in many places in Guatemala. Nearly all are sold for drinking. It is doubtful that a copra industry could be developed in Guatemala. Oil palm may have some possibility but United Fruit Company's plantings of African oil palm on both coasts have not been particularly successful so far.

Olives have been tried in Guatemala but with no success because they never fruit.

There are several types of marketing problems affecting fruit in Guatemala. To begin with, the quality of much of the fruit produced is rather low. This is only partly due to the varieties of fruit grown. In many cases, the quality could be improved considerably by better disease and insects controls, use of better harvesting methods and improved handling of the fruit after it is harvested. The second problem

is the small scale of production of most fruits at the present time. This limits the possibilities for expanding the processing industry for canned fruits, juices, jams and jellies.

There is a need for a limited amount of continuous research on varieties and production techniques for a few fruits. The most promising fruits at the moment would appear to be apples, peaches, oranges, tangerines and oil palm. Some attention also should be devoted to improving production and marketing techniques affecting the quality of fruit presently being produced. No truly serious marketing problems for fruit appear likely as long as the production of any particular type of fruit does not increase faster than 10 to 20 per cent per year.

8.4. Meat, Fish and Dairy Products

The main marketing problem affecting the meat industry in Guatemala is the lack of adequate slaughter and refrigeration facilities. This situation will probably improve gradually over the next twenty years as the road system is improved and the municipal slaughter houses are replaced by regional ones.⁸

Seasonal fluctuations in the supply of milk is considered to be a serious problem in some areas on the South Coast. It should be possible to solve this problem partially by making better use of the milk drying facilities at Asunción Mita.

The lack of adequate port facilities is frequently sighted as the main factor slowing the growth of the fishing industry. The limited

⁸Some suggestions and technical information related to refrigeration can be found in William Phaklides' report, "Preliminary Survey of Refrigeration and Cold Storage Facilities in Guatemala," USAID report, October, 1967.

consumption of fish in Guatemala appears to be primarily due to an inadequate meat distribution system. The price of fish is competitive with the better cuts of beef and the price of pork. Once adequate refrigeration facilities are available, the consumption of fish will undoubtedly increase.

8.4.1. Beef

Cattle farmers in Guatemala are usually fairly large farmers. About 65 per cent of their cattle are straight criollo cattle. First and second cross cattle from criollo cows and Brahman, Santa Gertrudis, Charolais, Holstein, Brown Swiss and Jersey bulls comprise about 30 per cent while pure bred and third cross or better make up about 5 per cent of the cattle. There are a number of good registered foundation herds now established in Guatemala which are contributing a good deal to upgrading beef herds throughout the country.

Most of the cattle marketed in Guatemala are grass fed. Over 50 per cent of the cattle in Guatemala are raised in five departments on the South Coast. Grass in this area is plentiful during the rainy season but very short by the end of the dry season. This along with the difficulties in curing roughages during the wet season makes it difficult to maintain a normal plane of nutrition for range fed cattle.

The nutritional problem is frequently sighted as the most important problem facing the livestock industry in Guatemala. The Ministry of Agriculture does not appear very concerned about this problem. There may be several reasons for this. First, cattle operations are frequently viewed by large farmers as land holding operations. Many cattlemen apparently hope to earn more in the long run from increases in land values than on beef production. As the price of land on the South Coast

increases the cattle industry will gradually shift to the new areas that are being opened up on the North Coast and the Peten region. This movement is already underway. Those cattlemen who remain on the South Coast will undoubtedly become more interested in increasing the beef producing capacity of their land.

Second, many of the cattlemen are outstanding farmers and are capable of determining if the nutrition problem is worth solving and how to solve it without outside assistance. In this case one would expect relatively little pressure from cattlemen for a government research and extension program on livestock nutrition. Given little or no demand on the part of livestock producers for such a program there is little reason for the Ministry of Agriculture to show any interest in livestock research.

The actual extent of the demand for cattle research and extension programs is difficult to determine. The Banco de Guatemala has been critical of the Ministry of Agriculture's lack of technical assistance to cattlemen. The bank apparently believes that this is one of the main reasons for the slow rate of growth of the cattle population in Guatemala. The Ministry of Agriculture has argued that it has a shortage of funds and lacks technical manpower in this area. Even if the funds were available, it appears doubtful that the Ministry could find the technical personnel for such a program.

The Ministry appears to have favored small farmers in its use of research and extension funds. This hypothesis is partially supported by the fact that the Ministry has tended to emphasize grain production programs. At the present time the Ministry apparently is becoming more interested in cattle production but this interest is not yet

backed by any action. The cattlemen meanwhile are beginning to turn to San Carlos University to provide technical information.

Cattlemen have shown little interest in using available by-products for fattening cattle. This lack of interest stems partly from the fact that there is very little price incentive and a very limited market for high quality beef in Guatemala. As the market for grain fattened beef expands, cattlemen will undoubtedly become more interested in the use of such by-products as cane molasses, cottonseed hulls and corn stalks.

Cattle producers have apparently been very interested in credit for the purchase of feeder cattle and for herd improvement. The Banco de Guatemala appears to have been fairly responsive to this situation. Since 1961 the bank has made available some 40 million quetzales to ranchers. None of these funds, however, have gone into research or extension programs.

A large part of the recent interest in credit for expanding beef herds is undoubtedly due to the favorable export possibilities. There are two beef exporting companies. Their volume of exports grew from 1,150,000 MT in 1961 to 8,283,400 MT in 1967. (See Table 8-2.) Beef exports by these companies nearly tripled between 1961 and 1962 and nearly doubled between 1962 and 1963. The rapid rate of increase in beef exports during this period was not matched by increases in the population of cattle. Although exports were only about 17 per cent of the internal consumption the rapid increase in exports was causing domestic shortages. As a result the exportation of meat was regulated by Decree Law No. 245 on July 9, 1964. The export quotas are fixed by the Ministerio de Economia. The Ministerio can revise the quotas during the year if it appears advisable to do so. In practice the export

TABLE 8-2

BEEF EXPORTS OF TWO EXPORT COMPANIES

Year	Volume (1000's of MT)	Value (1000's of Q)	Average Price (Q/Kg)
1961	1,150.0	834.0	72.5
1962	3,088.3	2,260.1	73.2
1963	6,114.2	4,542.5	74.3
1964	5,631.3	4,343.0	77.1
1965	4,713.3	3,839.3	81.4
1966	5,453.7	5,557.8	101.9
1967	8,283.4	7,884.0	94.6

Source: Export Companies

quotas have not limited beef exports. This situation may change in the near future, however.

The United States also established a quota system for beef imports in 1964.⁹ United States imports from Guatemala were less than the quota up until 1968. Beginning in September 1968 the United States began to request beef exporting countries to establish voluntary quotas on beef exports. The Ministerio de Economía fixed the beef export quota for 1969 at 21,400,000 pounds--which is the voluntary quota recommended by the United States. At the present time it appears

⁹Public Law 88-482 passed in August, 1964.

that the United States import quotas on beef from Guatemala will not increase by more than 3 to 5 per cent per year. In this situation the export quotas set by the Ministerio de Economia are in fact enforced by the United States and may in fact prevent exporters from shipping as much beef to the United States as they would like.

The domestic price of beef is fixed by the Ministerio de Economia. The maximum wholesale price for beef is presently set at Q0.27 per pound. The maximum retail price depends on the cut of beef. The maximum price on ordinary stew beef is Q0.27 per pound. The maximum price on many of the better cuts of beef ranges from Q0.47 to Q0.55 per pound. There is no maximum price set on the top cuts.

There is little evidence that the price controls on beef are enforced. Their main effect appears to be to establish a maximum price that the slaughter houses are willing to pay cattlemen for live animals.

The average export price of beef is around Q0.45 per pound at the present time. Thus there is little incentive to sell beef domestically if it can be exported.

Prices for domestic beef remained fairly stable between 1956 and 1962, and then increased gradually up to 1965 when they began to increase fairly rapidly. The price increases are undoubtedly due to rapid increases in exports coupled with the slow rate of increase in production.

Per capita consumption of beef declined from 8.6 to 5.6 kilos per capita between 1960-1967--a decline of about 35 per cent. (See Table 8-3). Per capita income was growing fairly rapidly during this period. Comparing the trends in per capita incomes, beef consumption

TABLE 8-3
BEEF YIELDS, CONSUMPTION AND PRICES

Year	Average Yield Per Head ¹ (kgs.)	Consumption per Capita ¹ (Kgs/Yr)	Average Wholesale Price of Beef ² (Q/Kg)	Average Retail Price of Top Cuts ² (Q/Kg)	Average Retail Price of Stew Beef ² (Q/Kg)*
1956	170	8.8	0.217	0.848	0.522
1957	174	8.9	0.326	0.870	0.522
1958	170	8.9	0.283	0.870	0.522
1959	170	8.6	0.261	0.870	0.522
1960	174	8.6	0.261	0.870	0.522
1961	174	8.1	0.283	0.870	0.522
1962	165	6.8	0.283	0.870	0.522
1963	165	7.0	0.304	0.913	0.522
1964	170	7.0	0.304	0.935	0.522
1965	165	6.6	0.304	1.022	0.543
1966	156	5.6	0.304	1.130	0.543
1967	156	5.6	0.304	1.109	0.543

Source: (1) Banco de Guatemala, "Programa de Desarrollo de la Ganadería Bovina de Carne en la Costa Sur," 1968.
(2) Dirección General de Estadística.

*Actual market prices are generally higher than reported fixed prices.

and prices it appears that the higher prices have more than offset the effects of higher income on beef consumption. Part of the decline in beef consumption apparently has been due to a change in the price of beef relative to chicken. The increased consumption of chicken has made it easier for the Guatemalan government to allow the increased exports of beef.

Other than export limitations, beef exporters do not appear to have any marketing problems which they are unable to solve on their own. The two processing plants for beef exports are inspected periodically by the USDA to assure that they meet USDA standards. There has apparently been no serious sanitation problems for beef exports. These plants supply part of the beef consumed in Guatemala City.¹⁰

Slaughtering facilities outside of Guatemala City leave much to be desired when it comes to sanitation. Furthermore, little attention is given to sanitation in either the transportation or retailing of beef. Thus improving the slaughtering facilities would only partly solve the problem of improving the sanitation of meat marketing. This problem is apparently not considered to be an especially serious one at the present time.

As the cattle industry shifts from the South Coast to the North Coast, the need for slaughtering facilities near Puerto Barrios will increase. Such facilities would handle beef exports.

The Banco de Guatemala's proposal for increasing beef production on the South Coast would tend to slow down the shift of the cattle

¹⁰For more detailed information on the slaughter houses supplying Guatemala City see: "A Study on the Production and Distribution of Meat for Guatemala City," a USAID report by Roy W. Snyder.

industry to the North Coast area. It would probably be easier to implement a cattle promotion program on the South Coast, however, because this area already has much of the human and capital resources needed for such a program.

8.4.2. Pork

Hogs are produced in relatively small numbers in practically all departments in Guatemala. The bulk of the hog production is on farms of less than ten manzanas each. Thus, unlike cattle raising, most of the hogs produced in Guatemala are grown by farm workers and Indian farmers. These farmers retain one or two hogs for their own use and sell the balance to local hog buyers. These buyers drive the hogs to nearby towns and sell them to butchers. They are then slaughtered and sold to retail merchants or directly to consumers.

There are very few specialized hog producers in Guatemala. They are located mostly in the corn producing areas of Escuintla, Jalapa, and Jutiapa departments. These departments supply a large percentage of the pork requirements of Guatemala City. Most other departments in Guatemala produce only enough hogs for their own use.

At the present time there appears to be no serious marketing problems for hogs. Most of the hogs consumed in Guatemala are marketed under rather unsanitary conditions compared to United States standards but the scale of most operations is too small to justify the investments which would be needed to improve the situation substantially.

The price of pork is nearly double to the price of beef. This appears to be more of a supply problem than a marketing problem. The supply problem in turn is basically a feed problem. The hogs on small farms are usually scavengers. They consume low quality grains and

other food items that can not be used for human consumption. Hogs on many large farms also serve as a means of marketing poor quality grains and agricultural by-products that have low market values. A substantial increase in hog production on a commercial basis would require large hog producers to purchase substantial amounts of corn that would otherwise be available for human consumption. This would tend to increase the price of corn and the cost of producing pork unless there was a corresponding increase in corn production.

Hog numbers have been increasing rapidly since 1964. (See Table 5-13 and Figure 5.7.) This increase appears to be due in part to the high price of pork and in part to the development of the livestock feed industry in Guatemala. The increase in pork production has helped to offset the decline in per capita beef consumption. Several firms have been established in recent years that specialize in prepared pork products such as pork sausage. These firms will provide a growing market for better grade hogs as domestic consumption and exports of their products increase.

8.4.3. Poultry

There has been a rapid increase in the production of chickens in Guatemala since 1962 because of the development of the broiler industry. The private sector appears perfectly capable of handling any marketing problems that may arise in this industry during the next few years.

8.4.4. Milk

The major areas of dairy production in their order of importance are the departments of Jutiapa, Santa Rosa, Escuintle, Guatemala and

Suchitepequez. The average daily production per cow for the country as a whole is around 2.8 liters which is a very low level of production. The average daily production per cow in the department of Guatemala is reported to be about 4.6 liters. The higher production in the department of Guatemala is due to better herds, a more favorable climate, better herd management and better feeding programs.¹¹

Dairy herds range from 5 to 40 cows with a few large herds of up to 1,000 cows. The majority of the herds are made up of native criollo and Brahman cows. Most of the dairy operations are dual purpose, producing both milk and beef. In many cases, the dairy operation is more or less a side business.

Dairy farmers in Guatemala apparently do not consider dairying to be a very profitable business. The main reason for this is that the price of pasteurized milk has been fixed at the same level for about 16 years while the cost of production has increased. As a result fresh milk is usually considered to be adulterated by adding water and dried milk. Furthermore, milk produced in some areas on the South Coast is shipped to El Salvador in order to obtain higher prices.

No evaporated or condensed milk is produced in Guatemala at the present time. The government's Prolac plant at Asunción Mita, however, does produce some powdered milk. Production of powdered milk in 1967 was reportedly about 150,000 pounds.

According to the Dirección General de Mercadeo Agropecuario there were 12 plants in Guatemala that processed at least 2,000 liters of milk a day for the production of cream, ice cream, cheese and butter.

¹¹Vard M. Shepard, The Livestock Development of Guatemala, USAID Report, Guatemala, August, 1967.

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The number of smaller plants was not specified but their total production was estimated to be about 5,500 liters per day.

There are four large pasteurizing plants in Guatemala City with a total capacity of 91,000 liters a day. These plants reportedly worked at about 50 per cent capacity in 1967 even though current milk consumption in Guatemala City is estimated to be about 200,000 liters per day. (See Table 8-4). They have established collection centers in the milk producing regions of the South coast and transport the milk to the capital in refrigerated tank trucks.

The farm price of grade A milk ranged from 10 to 14 cents per liter in 1967 while grade B milk for manufacturing purposes ranged from 8 to 10 cents a liter. The retail price of fresh milk in Guatemala City averaged 18 cents per liter. Pasteurized milk in bottles retailed at 20 cents and in cartons at 22 cents a liter. Cream retails at about 95 cents a liter while butter retails at Q1.05 per pound if it is pasteurized and about 95 cents per pound if not.

One of the major problems facing dairymen is the production of surplus milk during the wet season from July to October. Many of the small producers only milk cows during the flush pasture season which adds to the surplus supply. Some of the surplus milk is processed into dry milk at the Asunción Mita plant while most of the rest is converted into cheese.

The deficit in milk production is expected to increase from nearly 20,000 MT in 1970 to about 40,000 MT by 1980. There are a number of things that could be done to change this situation. To begin with, there appears to be a need for a general increase in milk prices. A detailed study of the present cost and price structure is needed, however, before

TABLE 8-4

MILK PROCESSING FACILITIES IN GUATEMALA:
PRODUCTION AND CAPACITY

Plant	1966 ²		1967 ²		
	Pasteur- ized Milk	Milk for Other Milk Products	Total	Average Daily Products	Total Daily Capacity
1. Foremost	10,780	3,220	14,000	20,000	40,000
2. La Pradera	11,475	2,025	13,500	14,700	20,000
3. Prolac ¹	1,680	6,320	8,000	6,000	30,000
4. La Modesta	4,800	--	4,800	10,000	15,000
5. Mariscal	1,200	--	1,200	--	--
6. Moderna	600	17,400	18,000	--	--
7. San Francisco	600	--	600	--	--
8. Rene Lavagnino	500	--	500	--	--
9. La Joya	400	--	400	--	--
10. La Palma	--	--	--	2,800	16,000
11. Sasso	--	5,000	5,000	--	--
12. Luis Urruela	--	7,000	7,000	--	--
13. La Fe	--	4,000	4,000	--	--
14. Parma	--	3,600	3,600	--	--
15. Los Cubanitos	--	11,000	11,000	--	--
16. Others	--	14,500	14,500	--	--
Total	32,035	74,065	106,100	53,500	121,000

Source: 1966--Dirección General de Mercado Agropecuario
1967--Agricultural attache, Guatemala based on industry reports.

¹Prolar plant is located at Asunción Mita near El Salvador border.

²All figures in liters per day.

any specific recommendations on prices can be made. At the present time, it appears likely that an increase in retail milk prices would benefit milk processors more than milk producers. If so, such a price increase would do very little to increase milk production. Thus any plan to increase retail milk prices should be designed in such a way so as to assure that a substantial proportion of the benefits will go to dairy farmers.

An expanded research and extension program designed to improve the productivity of dairy herds is also needed. Such a research-extension program should provide dairy farmers with more information on (a) efficient feeding programs, (b) the preparation, storage and use of silage, (c) disease and parasite control, and (d) how to plan and carry out herd improvement programs. A research and extension program which increased milk production by 5,000 metric tons per year (about 3 per cent of present production) would add approximately Q1,000,000 to national income each year. Such a program would be worthwhile even if the cost ran as high as Q200,000 per year. To the best of our knowledge, the Ministry of Agriculture has never undertaken a cost-effectiveness analysis of an expanded program in dairy extension. On the basis of the limited information available, it appears that it would be worthwhile to undertake such an analysis.

In addition to a research and extension program for dairying, it seems advisable to initiate a pasture improvement program. The basic research for such a program could perhaps be carried out best at a regional research center. The results of the research would be brought to the attention of farmers through the dairy extension program. A pasture improvement program would benefit sheep and cattle raisers

as well as dairymen.

The program outlined above would tend to aggravate the existing marketing problems associated with surplus milk production from July to October. This problem could be solved partially through more efficient use of the milk drying equipment at the Asunción Mita plant. Some additional investment would be needed in transportation facilities to handle the increased production. The milk processors should have no difficulties in obtaining funds for such investments. Little or no additional investment would be required in milk processing facilities because there is already a substantial amount of excess capacity in the industry. Nevertheless, an increase in the retail price of milk would probably lead to some additional investment in processing facilities for fresh milk. The increased production may also induce some additional investment in milk drying equipment.

Except for the marketing of surplus milk from July to October, the dairy industry should be able to solve most of its marketing problems during the 1970's without government assistance. The government will undoubtedly have to support a disease control program and enforce quality standards for milk products, but in the absence of a serious epidemic such programs should be fairly easy to carry out. The government will undoubtedly continue to be involved in price controls on milk and will have to show more flexibility in this area in the future than it has in the past.

Even with price increases and a substantial research and extension program to increase milk production it is likely that Guatemala will be deficit in milk production during the 1970's. Although this may be undesirable from a balance of payments viewpoint it should make it

easier for milk producers and processors to solve any marketing problems that may arise during the next few years.

8.4.5. Fish

The national production of marine products increased from about 1.6 million pounds in 1960 to over 4.6 million pounds in 1966--an increase of nearly 192 per cent over the 7 year period. Shrimp accounted for about two-thirds of the marine products in 1966. (See Table 8-5.) Most of the shrimp catch is exported to the United States.¹²

The bulk of the commercial fishing in Guatemala is done on the Pacific Coast. Fishing on the Atlantic Coast is generally considered to be more dangerous because of the strong winds during much of the year.

Guatemala maintains a 12 mile limit on national waters. Shrimp, lobsters and a fairly wide variety of popular fish are found within this limit. The shrimp area extends out to about 34 miles. Tuna is found about 180 to 200 miles off the Pacific Coast.

Guatemala's fishing fleet consists of about 30 commercial boats. The Captain and machinist on these boats are usually Japanese, Mexican, Peruvian or Panamenian. This situation is changing slowly as Guatemalans are trained for the jobs. The two main fishing firms employed around 740 persons on about a half-time basis in 1966.

One of the problems facing the fishing industry is the lack of adequate port facilities on the Pacific Coast. The fishing companies

¹²Much of the information in this section summarizes material presented in the study "Industria Pesquera En Guatemala," from the Banco de Guatemala's Informe Económico, Jan. -Mar., 1968.

TABLE 8-5

NATIONAL PRODUCTION OF SHRIMPS AND OTHER SEA FOODS
(Figures in 100 lbs.)

Year	Shrimps	Other Sea Foods	Total Fish Products ¹	Imports ²	Exports	Apparent Consumption
1960	693.9	89.6	1,585.9	1,188.2	556.1	2,218.0
1961	1,249.3	181.0	2,232.7	1,116.9	487.7	2,870.9
1962	2,233.7	326.2	3,362.2	1,238.9	1,862.4	2,738.7
1963	1,990.1	328.1	3,120.6	1,609.9	1,735.2	2,995.3
1964	2,900.4	509.0	4,211.8	1,642.1	2,703.4	3,150.5
1965	1,974.6	560.2	3,337.2	2,768.2	1,667.4	4,438.0
1966	3,117.6	713.8	4,633.8	1,692.8	2,580.0	3,746.6

Sources: (a) Dirección General de Recursos Naturales, Renovables.
(b) "La Situación del Desarrollo Económico y Social de Guatemala," Planificación Económica.
(c) División de Fauna Marina
(d) Anuarios de Comercio Exterior, Dirección General de Estadística.

¹Total fish products includes an estimated 802,400 pounds of fresh water fish and fish caught by small fishermen on the Pacific Coast.

²Includes fresh, dried and salted fish; shell fish and canned fish products.

have constructed some dock and repair facilities on their own. Dry dock facilities in Mexican ports are also used. Much of the shrimp catch reportedly moves from the Pacific Coast to the Matías de Gálvez port on the Atlantic Coast for exportation. The Pacific Coast ports at Champerico and San José do not have facilities for handling large boats at dock side. Products shipped from these ports are first loaded on small boats and barges and then taken to the large boats anchored off shore. The Pacific Coast ports also lack adequate refrigeration facilities for holding large quantities of shrimp for export. The need for improved international port facilities on the Pacific Coast is widely recognized not only by the fishing industry but also by the cotton, coffee, sugar and beef producers. Unfortunately there are no good natural harbors on the Pacific Coast. Thus the cost of constructing port facilities on the South Coast is expected to be rather high. There is also considerable debate about where the new port facilities should be located. This will undoubtedly delay the construction of new facilities for a few more years.¹³

The key law regulating the fishing industry in Guatemala is the Legislative Decree No. 1470 of June 23, 1961. This law authorized the Ministerio de Agricultura to license all firms engaged in commercial fishing in Guatemala in order to assure the rational exploitation of Guatemala's marine resources. Under this law the number of fishing

¹³The Secretaria General de Planificación Económica has prepared an economic feasibility study for the Pacific Coast port facilities. See its report "Estudio de Factibilidad Económica para un Puerto Comercial y Pesquero en el Litoral del Océano Pacífico." This study is one of several studies which attempt to determine where a port should be located.

boats that can be licensed is fixed as follows:

For the Pacific - 50 shrimp boats and 50 tuna boats,

For the Atlantic - 35 shrimp boats and 25 tuna boats.

The stated purpose for limiting the number of boats is to protect Guatemala's shrimp resources from excessive exploitation.

The Industrial Promotion Law provides several tax benefits to new firms entering the fishing industry. Under this law new firms are allowed to import machinery and equipment duty free for ten years. They are also exonerated from all taxes on profits for the first five years and 50 per cent of the taxes for the next five years. This law is of little value to new firms, however, if they are prevented from entering an industry by other laws.

In 1966, Guatemala imported about two-thirds as much fish as is exported. (See Table 8-5) The apparent consumption of fish per capita in 1966 was only 0.82 pounds which is about 36 per cent of the minimum recommended consumption.¹⁴ Based on past trends, the total production of marine products is estimated to be 5,805,800 pounds in 1970 and 6,601,000 pounds in 1972.¹⁵

The low level of fish consumption appears to be partly due to the inadequate marketing system for fresh fish. As the marketing system for fresh meats improves the consumption of fish will undoubtedly

¹⁴See "Evaluación de la Información Existente en Relación Al Estado Nutricional de la Población Guatemalteca" by Dr. Romeo de León Méndez.

¹⁵Banco de Guatemala, Informe Economico, January-March, 1968, p. 55.

increase. The domestic fishing industry should be able to supply the demand. The key factor is the availability of more refrigerated facilities for transporting and retailing meats.

The modal retail price of fresh fish in Guatemala City in 1967 was Q0.45 which is equivalent to the price per pound of an average cut of beef. The market for top quality shrimp in Guatemala is very limited. Improvements in the marketing facilities for fish would not result in a substantial increase in shrimp consumption.

The favorable export prices for shrimp has led the fishing industry to concentrate on production for the export market rather than on the development of the domestic market. It seems likely that the fishing industry will develop the tuna fishing industry before attempting to expand the domestic market for fresh fish products.

The development of tuna fishing in Guatemala will require fairly substantial investments in addition to the cost of improved port facilities. A plant with a processing capacity of 12,000 tons would cost about Q1,500,000 to construct and require another million quetzales of operating capital. The estimated cost of tuna boats is around one million quetzales each.¹⁶

The growth of the livestock feed industry in Guatemala has expanded the domestic demand for fish meal considerably. Total imports of fish meal increased from 3.7 metric tons in 1960 to 823.6 metric tons in 1965 and then dropped to 391.0 metric tons in 1966. A 2,300 ton fish meal plant would cost about Q415,000 to construct and operate.

¹⁶Based on estimates in the Arthur D. Little report, "Alimentos para Exportación," 1965. Also see the Banco de Guatemala's Informe Económico, January-March, 1968, p. 69.

There is insufficient information available to determine if such a plant is economically feasible at the present time. According to the Banco de Guatemala's estimates, however, the plant should be able to produce at a cost less than or equal to the present CIF price of fish meal.

The production of quick-frozen fish offers another possibility for developing the fishing industry in Guatemala. A quick freezing plant with an annual capacity of 1,250 tons of fish would cost about Q120,000 to construct and require another Q50,000 as working capital. The cost per pound of fish would be about Q0.21 provided that the plant were able to operate at nearly full capacity at least 300 days each year. This would be primarily an export operation.

8.5. Proposed Changes in the Marketing System

The lack of reliable statistical data and thorough feasibility studies makes it exceedingly difficult to arrive at concrete proposals for improving the food marketing system in Guatemala. In many cases there is widespread agreement that certain improvements are needed when even rough estimates indicate that the benefit-cost ratio for such improvements are extremely low. In other cases there is little interest in projects that appear to have extremely high benefit-cost ratios. The interest or lack of interest in projects frequently depends more on how the benefits are distributed than on the size of the benefits relative to costs. Thus interest in a project is not an especially good criteria by which to measure the need for a project. Recommendations, however, can not be based entirely on benefit-cost ratios. A shortage of qualified personnel, for example, can make it impossible to carry out a project even though its benefit-cost ratio may be high. The recommendations presented in this section are not based entirely on benefit-cost ratios

or the criteria of popular interest. They reflect our judgements as to which projects appear to be most worthwhile, the type of programs that are likely to be most successful and what additional information is needed before specific recommendations are possible.

A general proposal has been made by the Guatemalan government for the construction of a number of packing sheds for fruits and vegetables to be located throughout the country. The economic feasibility of such centers has not yet been demonstrated. The existing distribution of vegetable production is such that one or two such collection centers are probably economically feasible. We recommend that an economic feasibility study be made for one or two such centers for fruits and cool season vegetables. The Quezaltenango area appears to be one of the most likely locations for a feasible center. The collection centers could serve as shipping points for fruits and vegetables being exported to other Central American countries as well as information centers for produce growers and wholesalers. Ideally, procedures would be established for sealing truck loads of fruits and vegetables for export at the centers in order to avoid in-transit damages associated with unloading and reloading at international border inspection points.

Covered unloading and reloading facilities are needed at border inspection points, especially at Pedro de Alvarado.

A small program should be undertaken to introduce growers and wholesalers with improved methods of handling and packing fruits and vegetables. Such a program should be of special value to exporters.

The main marketing problem for fish and meat is the lack of adequate refrigeration facilities at the processing and retail levels.

Consideration should be given to the possibility of establishing a small loan fund for the purchase of refrigeration units at low interest rates.

The main marketing problem of milk producers at the present time appears to be the prices received. Very little information is available on the possibilities of changing the existing price structure. In light of the substantial deficits in milk production projected for the 1970's, a general study of the dairy industry in Guatemala should be undertaken to determine if altering existing prices would in fact lead to production increases.

The desirability of an international port on the Pacific Coast is obvious. The economic feasibility of such a port appears questionable at the present time. The relevant question, however, is whether or not the port will be economically feasible by the time it is constructed. The answer is, "Probably so." The limited information available suggests that San Jose is the preferable location for such a port.

The government's past policy of leaving the marketing of food products to the private sector should be continued. There is no evidence to suggest that changes in existing laws or the passage of new laws would substantially affect the efficiency of the fruit, vegetable and meat marketing systems. Eventually it may be advisable to change the law regulating the number of fishing boats but there is little evidence that the law as such is seriously restricting the growth of the fishing industry. Consideration should be given to the possibility of establishing a marketing facilities fund to provide low interest rate loans for the purchase of food marketing equipment such as refrigeration units, sorting equipment, storage facilities, etc. by private businessmen and farmers associations.

CHAPTER 9

ALTERNATIVE POLICIES AND PROGRAMS FOR AGRICULTURAL DEVELOPMENT

For a government, agricultural development is a management problem, a problem of selecting objectives, of establishing priorities, of integrating and implementing the component pieces of a program. In discussing priorities and programs, it is tempting to set forth a list of "essentials" that the government must accomplish; there must be programs of production-oriented research, of road-building, of irrigation and land improvement, of market expansion, of education and extension, of input distribution, of credit and price stabilization, and so on. Projects can be elaborated, financed and implemented in some or all of these areas of action. We would stress that a prior necessity is a clear understanding and a firm acceptance by the national political elites of the goals and objectives of agricultural growth and development. Policies and program priorities can then be determined more consistent with those goals and as effective as possible in terms of the goals. Starting with policies, programs and projects puts the cart before the horse; objectives have to be specified before priorities can be determined.

To build a modern and productive agriculture throughout Guatemala will require mobilization and utilization of an ever-increasing quantity of public and private resources. The most important role for

the government will be the promotion of programs and institutions that generate streams of new technology and provide the basic services that require large investments and long periods of time for payoffs. Education, research and infrastructure are high on the list in Guatemala. In addition, policy measures and programs to intensify use of land and to strengthen incentives for private investment in agriculture and supporting industries deserve special emphasis.

9.1. Goals and Objectives of Agricultural Growth

We will begin our examination of alternative policies and programs for agricultural development by focusing on the goals and objectives which constitute the possible payoffs from agricultural growth. In economic terms a payoff is a measure of the results attributable to investments in services or social overhead or the implementation of new policies. The valid measures of these payoffs are the contributions to specified goals and objectives. Where goals are confused or incompatible, policies are very likely to be uncertain and unproductive. When governments are unable or unwilling to specify the objectives of agricultural development, programs of action can remain hesitant, ineffective and filled with self-defeating features. A clarification of objectives is, therefore, an essential first step in the formulation and implementation of development programs in Guatemala.

It is the essence of the problem, however, that formation of public policy necessarily involves a compromise that mixes different goals. While these goals are not always incompatible, an effective strategy usually requires that weights be attached to settle problems of precedence and priority. Weights which have been attached to some goals are fairly clear from the record of past agricultural policies in Guatemala. After

reviewing some of these goals, we will point out why we feel the information presented and analyzed in this report supports different weights and priorities than those which appear to have been used in the past.

9.1.1. The Output Objective

Growth in output is an important contribution which agriculture can make to the overall economy. Given population growth, increases in per capita income and the needs for industrial raw materials and exports, it is possible to derive a desired growth rate for agriculture which is consistent with national economic objectives. If this growth goal can be achieved, agriculture will contribute more and better food for a growing population at constant or declining real prices, earn increasing amounts of foreign exchange and provide necessary raw materials to expanding food and fiber industries. The increased output may make an important direct contribution to overall growth goals and indirectly stimulate growth in agricultural input and processing industries. Nutritional needs of the population can be more nearly fulfilled consistent with the growth in effective food demand. The market for manufactured consumer goods can expand in the rural areas. Balance of payments problems may be alleviated. Pressures on prices, especially of basic food products which are closely tied to wages and industrial costs, can be reduced.

The agricultural sector in Guatemala has made an important contribution to the balance of payments objective in the past. This fact emerged very clearly in our analysis of the overall economy and the agricultural sector in Chapters 2 and 3. The country faces a growing balance of payments problem, however, reflecting the poor market prospects for traditional export crops, especially coffee and cotton.

This means that, where possible, output expansion for agricultural exports should be directed to new or existing commodities with more promising market potentials.

The nutrition problem in Guatemala is known to be severe and is becoming worse as population grows rapidly. Thus, there is need to increase the output of basic food products for domestic consumption. It should be recognized, however, that expansion of effective demand is a necessary pre-condition for success of programs designed to increase output of basic foodstuffs. Demand must especially be expanded among the low-income population, the bulk of which lives in the rural areas. This problem is concentrated in subsistence agriculture in the central region. The country is apparently unwilling, nor could really afford, to undertake extensive income redistribution to provide the necessary purchasing power to this large population group. Their food consumption and general economic status can be improved significantly only if they can be helped to produce more for home consumption and sale. It would seem that Say's Law must be brought into play in Guatemala if food demand among low-income farmers is to rise commensurate with growth in output!

In aggregate terms a growth rate of 5 per cent per year in agricultural output would provide for a 3 per cent population growth, some increase in per capita food consumption in response to income changes, and increasing exports. This rate is somewhat above the level achieved in recent years. There is little doubt that land and labor resources are at hand in Guatemala to achieve this or an even higher growth rate if science and technology can be brought to bear on the problems of agricultural productivity. Higher growth rates will be especially beneficial if production

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is increased in the areas and among the farmers whose effective demand for food will respond to their increased income. Similarly, more production of export crops is desirable to the extent that markets are available. Higher production of domestic food crops without concern for effective demand or of traditional exports for which there is no market is likely to result in glutted markets and falling prices which would discourage further growth.

9.1.2. The Employment Objective

Guatemala has a serious and worsening employment problem. Population growth exceeds three per cent per year and the age distribution is such that the labor force is growing even more rapidly than the overall population. Non-agricultural employment is increasing, but far less rapidly than necessary to absorb the growing work force. The bulk of the larger labor force is being absorbed in agriculture where employment is growing at about 2 per cent per year. Probably 16,000 to 17,000 workers are added to the agricultural sector each year. Some of this increase is taking place in the coastal region, where the number of small farmers and resident farm workers is growing. The major increase, however, is in the number of subsistence farmers in the central region. There, as shown in Chapter 4, the increase is associated with a substantial decline in the average size of small farms and a noticeable deterioration in soil fertility. Output per person is falling and there is growing underemployment of labor resources. There can be no doubt that the provision of productive employment for a growing work force is an important objective for the agricultural sector in Guatemala.

9.1.3. Income Distribution and Rural Welfare

It is possible to accelerate the growth in agricultural output without

concurrent attention to income distribution and rural levels of living. Production can be generated through programs and the play of economic forces with little attempt to benefit the bulk of the rural populace. This is an approach that simplifies development planning but does nothing to promote development in its broadest sense or the widespread transformation of the traditional sector.

We would not advocate that, where production has yet to rise, agricultural development programs be justified by pointing to the organization of farmers' associations, road construction, improving local self-government or implementing community development activities. These accomplishments have merit in themselves but they do little to directly advance agriculture. We would stress, however, that in a country like Guatemala weight must be given to welfare as well as to output. Programs should be sought which increase output but simultaneously improve income distribution and contribute to rural welfare. This means that questions of where and how output is increased assume added importance.¹ As emphasized in Chapters 2 and 3, growth without development has generally characterized the country since 1950. We would urge that growth with development become the central concern of Guatemala in the future.

9.2. Major Elements of an Agricultural Development Policy

On the basis of the data and analysis presented in earlier chapters we are convinced that future development programs in Guatemala should

¹ An example is provided in Section 9.4. below where we analyze the implications of concentrating corn production programs in the coastal vs. the central region.

give highest priority to improving the productivity of land and labor resources in the agricultural sector. Programs designed to achieve this goal should emphasize increases in rural employment and improvements in income distribution as well as increased output. Producing more per hectare and per man is the best way to reconcile the apparent conflict between output and welfare goals. To accomplish this blend of output and income distribution objectives, policies and programs must be matched to the needs of different types of farmers and different geographic areas of the country.

9.2.1. The Commercial Large-Farm Sector

We take it for granted that extensive involuntary redistribution of land now in large farms in Guatemala is not politically feasible. Therefore, we suggest that policies for the commercial sector should focus on tax, price and wage programs designed to encourage more efficient production and to support increased investments in services, social overhead, technical assistance and credit programs designed to increase production of exportable crops.

Data presented in Chapter 4 shows that the major problem with land use in the large-farm sector is that land is used extensively (natural pasture) or not at all (fallow). There is no conclusive evidence that crop yields are lower for large farms. The less intensive use of land by large farmers, however, does result in an inverse relationship between size of farm and average output per hectare. That is to say, on the average large farmers produce less per hectare because they use less of their land intensively than small farmers. One way to increase the productivity of large units is to make it expensive to hold large tracts of

land idle or in extensive uses. The existing idle lands tax is one tool to use for this purpose. A property tax progressive with farm size is another tool and has the advantage that it would probably be easier to administer. The purpose of these tax devices is to encourage owners to place land in production or to sell it to someone who will.

A second need is to influence what is produced in the large-farm sector. Price policies can be used for this purpose. The export tax on coffee, for example, is a price policy which reduces the returns from coffee production relative to other crops. Thus it reduces incentive to produce coffee and encourage shifts of land to other commodities. The existing export tax on coffee should, therefore, be continued and probably increased as long as market prospects for coffee production in excess of Guatemala's quota remain poor. The use of this price policy should be coordinated with technical assistance and credit programs designed to stimulate profitable diversification opportunities. Through diversification, the large-farm sector should be expected to continue to provide important export earnings. These are the farmers that should have the capital and management knowledge necessary for successful diversification.

A third need is to increase government revenue to support larger public investments in agricultural services and social overhead facilities. This revenue cannot easily be obtained by taxing the small non-agricultural sector; if it is to be mobilized domestically it must come from within the agricultural sector. In turn, any consideration of the ability-to-pay principle shows that such revenues in agriculture must come from the large-farm sector at least until income in the subsistence sector can be increased substantially. An effective and progressive income tax is

probably the most feasible way to augment public revenues to finance expanded agricultural development programs.

Another element in commercial-sector policy is the need to intensify and expand programs designed to improve wages and working conditions for resident and migratory farm workers on large farms. The goal should be to upgrade this employment--in terms of wages, housing, medical care, etc.--to the level of urban industry. Implementing the minimum wage legislation would make a good beginning. Higher real wages for workers will also create incentives for land owners to increase their productivity; workers who are paid more must be used to produce more if their employment is to be profitable.

9.2.2. The Subsistence Sector

We recommend that high priority be given to improving productivity and welfare of small farmers in Guatemala. All the data that have been reviewed on production, yields, farm size income and employment indicate that the position of small farmers is extremely poor and has deteriorated considerably since 1950. This is especially true in the central region where population growth is resulting in a decline in the average size of small farms and where yields per hectare are stagnant or declining. Over large areas of the central region, per capita production is surely falling and total production may be declining as well. Emphasis on yields per hectare seems to be the best way to overcome growing underemployment and raise rural levels of living for this large population group. Given existing demand conditions for traditional exports and domestic food crops, this policy will also mean little loss, if any, in terms of the output objective.²

²Some additional support for this statement is given in Section 9.4. below.

There is an urgent necessity to implement programs for family planning and birth control as effectively and as rapidly as possible. Otherwise, improvements in productivity, employment and income will be quickly swept away by population growth. A reduction in the rate of population growth will be required if long-term gains in the subsistence sector are to be attained.

Another theoretical possibility is to encourage outward migration. Such movement could be to the cities or to the new agricultural areas in the coastal and Peten regions. We conclude, however, that improvements must be achieved where the people are now located; there is no other way to get at the crux of the minifundia problem. There is no reason to believe that the urban working force will be able to absorb unskilled labor in the future at a higher rate than is now occurring. Thus, more migration to the cities will largely swell the ranks of the urban un- or under-employed, a familiar problem in many other Latin American countries. Similarly we see no reason for optimism about the rate at which more families can be absorbed on new lands in the colonization areas.

The basic element in subsistence-sector policy is the necessity to improve yields per unit of land. Most of the land in small farms is already in production. Some of this land can be improved through irrigation and drainage programs, but most of the output increases must be achieved through the use of new inputs and improved practices. Output increases achieved in this way will absorb more labor and help reduce underemployment in the agricultural sector. At the same time, the increased productivity will mean more food for home consumption and more sales for cash income to be used for consumption and input purchases, thereby stimulating production in nonagricultural sectors.

Another important element is the development of rural construction programs designed to improve social overhead facilities. Where under-employment is prevalent and productive employment is a high priority objective, rural construction projects can be used to increase job opportunities sharply. Road building is a good example. Rural Guatemala is sadly deficient in access and farm-to-market roads. Such roads are necessary if subsistence farmers are ever to be integrated into the market economy. Using local materials and drawing on the large pool of under-employed workers, a widespread road building and rural improvement program would appear feasible and desirable.

It has been argued that the payoffs to be obtained in the subsistence sector are low. This argument is hard to accept. Available data show that with existing varieties corn in the central region can return from 4 to 7 quetzales for every quetzal invested in fertilizer. This compares favorably with the returns to corn fertilization available in the coast.³ With more responsive varieties and a package of improved production practices, the rate of return can be sharply increased. At the same time, more labor will be absorbed in production, productivity per man will be higher, incomes will increase, rural markets for consumer goods and inputs will open and expand, and levels of living will be elevated. This interaction of new technology with output and productivity is the essence of the reconciliation of growth with development in the subsistence sector.

Nor do the data support the argument that the traditional farmer with his stubborn resistance to change, his low aspiration level and his

³Data supplied by Dr. J. L. Walker, North Carolina State University, from his soil testing project in Guatemala. For a large fertilizer program, the overall benefits may be substantially larger in the central region. See Section 9.4. below.

ritualism is the major constraint holding development in the subsistence sector in check. We recognize that there are cultural differences in work habits and receptiveness to change among farmers in Guatemala which may make it more difficult to design programs tailored to the needs and conditions of different groups of farmers. Nonetheless, we know of no country where highly productive and profitable technology, that had been tested, proven and made available to farmers along with the requisites for its use, has languished unadopted because farmers were small and traditional. If past programs to promote peasant production have yielded little more than disappointment, the absence of productive technology or distorted price relationships are more likely to be the explanation than the neophobia of the farmers.

In Guatemala, the most notable success with small farmers has been the wheat program. New, higher-yielding wheat varieties are widely used. Most wheat farmers use fertilizer, insecticides and other improved practices. The government has encouraged wheat production through research, extension, credit and price-incentive programs. The interesting point, which has not been stressed in previous evaluations of the wheat program, is that wheat farmers are also much more likely to use chemical fertilizers on corn than are other subsistence farmers. Results from wheat have shown the productivity of this practice to the farmers and have provided cash or credit for fertilizer purchases for use on corn. This is an example of the stimulative and cumulative power of new technology in transforming traditional agriculture.

9.3. Increasing Productivity in Subsistence Agriculture

We recommend that the initial focus of a program for the subsistence

sector focus on raising yields per hectare of the two basic subsistence crops, corn and beans. The basic ingredients of such a program should be the promotion of the use of chemical fertilizer and improved seed along with better production practices, insect and disease control, and harvesting and storage methods. Existing varieties and information on soils and nutrient deficiencies should be sufficient to begin this program.

The initial constraint will probably be the lack of trained personnel to serve as "change agents" in the field. Existing personnel of the Extension Service, the Indian Economy Development Service, the supervised credit agency, the Agricultural Development Bureau and the Agrarian Bank should be given in-service training and assigned to this activity. Integration of these agencies will release persons from administrative duties and increase the number of field workers available from existing resources. New agents will have to be recruited and trained as rapidly as possible.

In the early phase, fertilizer and seed should be distributed directly to farmers as credit-in-kind. Private companies should be encouraged to organize distribution systems and provide market outlets. Subsidies to permit inputs to be priced at levels consistent with efficient, large-scale distribution should be considered. Their purpose would be to remove the disincentives of small-scale, high cost distribution on farmer adoption of new inputs. A system of crop insurance and storage facilities to stabilize prices at harvest would reduce risks associated with the use of the new inputs. The basis for production credit should be the productivity of the new practices. The loss of future credit can provide the incentive for repayment.

It is difficult to spell out in detail the organization and costs of

such a program. Some assistance in designing it could probably be obtained from the Puebla Project in Mexico which is being carried out by the International Center for Corn and Wheat Improvement. This project is attempting to raise corn yields in a large highland valley area of the State of Puebla, Mexico. Farms are small and corn is the major subsistence and cash crop. There is little irrigation; corn is produced with natural rainfall. The project is using mass selection techniques to improve and adapt varieties, experimental plots to develop a package of improved production practices, and extensive demonstrations to inform farmers of the potential yields. The problems, techniques and results of this project should be relevant and adaptable to conditions in the highlands of Guatemala.

Immediate attention must also be given to the research base for corn and bean improvement. More responsive varieties, profitable levels of fertilization, number and timing of fertilizer applications, plant population density, insect and weed control and disease prevention, must all be considered when developing a "package" that can dramatically increase yields under various geographic and climatic conditions. This type of locally-adapted, production-oriented research is virtually unknown in Guatemala; a crash program will be needed if research results are to be available as soon as they are required.

At a later stage, more emphasis can be given to the diversification of production in the subsistence sector. The technical basis for diversification is not now adequate and must be improved. Vegetables and fruits are the main possibilities; their short-run potential and prospects were discussed in Chapter 8. Higher corn and bean yields should release land for diversification and make small farmers more willing and able to try

new crops. Insurance against crop losses and market expansion to improve and stabilize prices can be especially important in providing the incentives that are necessary to encourage diversification by small farmers.

9.4. Where Should Corn Production be Increased?

This section is concerned with the question of where increased corn production should be encouraged. It assumes that a decision has been made to give high priority to a program designed to raise corn production by means of higher yields per unit of land. It further assumes that human and financial resources are sufficiently limited so that such a major program cannot be implemented in both of the major producing areas at the same time. The issue, therefore, is whether precedence should be given to the coast or to the central region.

Several important factors would facilitate the program in the coast. Rainfall, topography and temperatures are quite favorable for corn production. Two and sometimes three crops per year are possible in some zones. There are fewer farms, hence fewer decision makers to be influenced. Financial institutions and input supply systems are fairly well developed. Yields currently obtained are higher than those in the central region and could profitably be increased two to three times (at existing prices) by applying the proper quantities and types of fertilizers. Farmers are more familiar with chemical fertilizers and farms are more mechanized.

To illustrate the effects of a fertilizer program focused on the south coast, we shall assume that an additional \$2,500,000 is used to purchase fertilizer for corn each year. Current yields in the coastal

region are estimated to be about 1,200 kilos per hectare overall. Although experimental data are scarce, the limited information available suggests that it should be possible to increase corn yields by about 1,000 kilos per hectare by using an average of 400 lbs of fertilizer per hectare. Assuming a farm price of \$6.25 per hundred pounds, the total cost of fertilizer per hectare would be \$25.00. Thus an annual expenditure of \$2,500,000 for additional fertilizer would increase corn production on 100,000 hectares in the south coast by about 100,000 metric tons. This region is already the major surplus corn production region in Guatemala. Thus nearly all of the additional corn produced would be marketed.

The increased production of corn would cause the farm price of corn to fall. The extent of the price reduction would depend on both the price elasticity of demand and the total supply of corn in relation to the level of demand. The projections in Chapter 4 indicate that corn production under current conditions would be about 800,000 metric tons by 1971-1972 when a program such as the one being considered here could be carried out. Assuming the price elasticity for corn to be 0.7, and total production including the increase to be 900,000 MT, the farm price of corn would have to decline, on the average, by 17 per cent in order to clear the market. At present prices this would mean a fall in the farm price of corn from Q66 to Q55 per metric ton. Due to the inelastic demand the total value of the national corn crop would fall from Q52,800,000 to Q49,500,000.

Effects of the program would be quite different for the producers who participated than for those who didn't. In the coast, farmers using the fertilizer for corn would increase the value of output per hectare from Q79.20 to Q121.00. This means that the \$25.00 spent for fertilizer

per hectare would return \$42.00 or \$1.68 for each dollar spent for fertilizer. In total, the \$2,500,000 used to purchase fertilizer would generate a gross additional return of \$4,200,000 for the farmers in the program.

The lower price for corn would reduce the value of output for farmers not using additional fertilizer. In the coast, average value per hectare would fall from Q79.20 to Q66.00, a decline of more than 20 per cent. These losses would fall largely on small farmers unless extensive efforts were made to get them to use the fertilizer. Assuming yields in the central region to average 750 kilos per hectare, the value of output for all corn producers in that region would decline from \$49.50 to \$41.25 per hectare, a decline of 17 per cent. Thus, incomes of all producers not participating in the fertilizer program would fall and this effect would be especially serious and widespread on the large number of small corn producers throughout the central region.

The lower price would benefit consumers in the urban areas and the deficit corn consuming areas of the central region. These areas were identified in Chapter 7 as net importers of corn and they contain some of the worst poverty zones of the country. Many small highland farmers both sell and buy corn. At harvest they sell some corn to repay debts and obtain cash for other purchases. Later in the year, cash income received for artisan production or off-farm work is used to buy more corn. For these producers, gains as consumers would have to be balanced against losses as producers. If corn purchases exceed sales, the producers should experience a net gain. The balance might well incline toward net losses, however, if the increased production were to result in sharp declines of price at harvest followed by higher prices after harvest.

Complementary programs of price stabilization and storage could help to prevent this "double squeeze" on deficit producers.

An alternative is to focus the fertilizer program on the central region. There are several disadvantages associated with such a program. Topography, climate, depleted soils and traditional farming methods have resulted in low yields in many zones of the region. Furthermore, the large numbers of small farmers will be difficult to reach with yield-increasing programs. It is also unlikely that a large scale fertilizer program could be implemented as rapidly in the central region as on the south coast because of the difficulty in extending the program over the entire region.

As indicated above current yields in the central region are about 750 kilos per hectare overall. There are sufficient experimental data to suggest that it is reasonable to assume that production per hectare could be increased to 1500 kilos by using 200 pounds of fertilizer costing \$12.50. This calculation assumes the marginal response to fertilizer is greater over the 750-1500 kilo range than over the 1200-2200 range. Thus, an annual expenditure of \$2,500,000 for additional fertilizer would increase corn production on 200,000 hectares in the central region by about 150,000 metric tons.

Not all of this corn would reach the market, however. In fact, if production increases were achieved among small and poor farmers, much of the corn would go for family consumption, thereby directly improving their real income. If we assume that one-third of the additional production would be consumed at home, then about 100,000 metric tons would enter the market. Using the same demand assumptions, the farm price of corn would decline to Q55.00 per metric ton as before. The

total value of the national crop would be Q52, 250, 000, down only slightly from the value of Q52, 800, 000 for the projected 800, 000 MT crop.

For the farmers using the fertilizer, the additional value per hectare would be equal to \$33. 00 in response to an expenditure of \$12. 50 for fertilizer. In total, the \$2, 500, 000 spent for fertilizer would generate \$6, 600, 000 in additional value of output for the producers. This is an increase of more than 50 per cent over the value of additional output on the coast for the same expenditure on fertilizer. Additional labor would be needed on the 200, 000 hectares to apply the fertilizer, carry out complementary practices and harvest the larger crop.

The lower price for corn would have the same beneficial effects for deficit urban and rural areas and the same income-decreasing effects for farmers in the coastal and central regions not involved in the program as were discussed earlier. If corn production were not profitable in the coast at the lower price, however, producers would possibly be encouraged to diversify production where soil and climatic conditions are relatively favorable for a wide range of products.

The gains from a fertilizer program in the central region can be summarized as follows:

- 1) a rise in real income for producers using fertilizer from the 33 per cent of additional production consumed at home;
- 2) an increase in cash income for these producers of Q6, 600, 000 from the outlay of Q2, 500, 000 for fertilizer, which would be available to purchase food, consumer goods and other farm inputs, thereby raising living standards and opening markets for industry;

3) more absorption of labor in corn production because there is less mechanization than in the coast and a larger production area would be involved;

4) prices and supplies of corn for deficit urban and rural markets equivalent to the program in the coastal region.

The main advantage in the coastal region is the relative rapidity and simplicity of getting the fertilizer used there. It is not at all clear that a program could be designed within the existing constraints of human and financial resources that could achieve the levels of fertilizer use being discussed on corn in the central region in a period of two to three years. It would seem, therefore, that relaxing these constraints is exceedingly urgent; some of the suggestions in previous sections were made for this purpose. At the same time, fundamental questions can be raised about the desirability of a large-scale fertilizer program to increase production of a subsistence crop such as corn within a largely commercial subsector. The most serious question would appear to be the income effect on the vast majority of corn producers who would be cut off from the new and more productive technology being applied by the fortunate few.

There are, of course, serious cost considerations not yet recognized in this discussion. The most important relate to government-provided research and extension, better storage and marketing facilities, credit and incentive-producing pricing for inputs and products. More information and analysis would be required to clarify the relevant cost-benefit ratios.

While the assumptions made above seem reasonable in light of current knowledge, more research is desperately needed to improve the

numerical magnitudes involved in the discussion. A model which would incorporate realistic production coefficients at alternative levels of fertilization in both regions, empirically-based estimates of home consumption of corn and income and price elasticities for food and non-food expenditures, and accurate knowledge of geographic, seasonal and vertical price relationships could vastly improve the analysis sketched above.

9.5. The Importance of Marketing

There has been a good deal of discussion in recent years concerning the importance of marketing in agricultural development. There are two sides to agricultural marketing. One side includes those activities connected with the movement, handling, storage, processing and distribution of food commodities from the time they leave the farm until they reach the final consumer. The other involves the movement of agricultural inputs from the manufacturer to the farmer. The markets for inputs and outputs are closely related. Credit extended by food wholesalers, for example, can facilitate access by farmers to new inputs. The introduction of new inputs and technology may increase the flow of farm products through the food wholesalers. The ability of food wholesalers to obtain favorable prices for farm products and to keep marketing charges low relative to the final value of the product affects the profitability and demand for new inputs and technology. Agricultural development involves changes in both types of agricultural markets.

Given a limited amount of funds for development programs, the question arises as to what priority should be assigned to projects

designed to improve the efficiency of the agricultural marketing systems in Guatemala. There is no unique answer to this general question. Some marketing projects should be given high priority while others should remain on the shelf for a few more years. There are a wide variety of factors that must be taken into account when assigning priorities to marketing projects. A few of the more important factors are:

- a. the scale for production and the nature of the marketing system for each product,
- b. the availability of competent personnel to carry out the projects,
- c. the existence of other programs that might create marketing problems.

A few examples will serve to illustrate this point.

The quantity of fresh fruits produced on a commercial scale is too small at the present time to justify a large program to introduce improved methods of handling fruits. Initial attention should be centered on a limited program designed to increase the production of the few fruits that appear to have the most potential for export.¹ Once there is evidence that fairly substantial amounts of such fruits will be coming on to the market within three to four years, the next step would be to begin training specialists in fruit marketing. Once the fresh fruit and the marketing specialists are available, programs to improve the efficiency of the marketing channels for fruits should be given higher priority than

¹The most promising fruits at the moment appear to be apples, peaches, oranges, tangerines and oil palm.

programs to increase fruit production. If existing programs to increase fruit production are reasonably successful during the next several years, then graduate level training of fruit marketing specialists should begin in about 1972 and emphasis should be placed on fruit marketing problems beginning in about 1975.

In the case of vegetables, the production and marketing programs need to be carried out simultaneously and to receive equal priority. The production program should emphasize the production of high quality vegetables while the marketing program should emphasize proper handling techniques. Such a marketing program should have two main goals. The most important goal is to increase the profits of vegetable producers. The second goal should be to increase vegetable exports. These goals are basically complementary. A marketing program built around producers organizations should be able to achieve both goals. Such organizations could provide producers with production information and farm supplies as well as marketing services. The program would have to devote some attention to reducing barriers to trade in vegetables between Central American countries. While technicians may play an important role in identifying such barriers, the elimination of the barriers is primarily a political problem. Central America has made considerable progress in solving such problems in recent years, thus it seems advisable for both production and marketing specialists to proceed on the assumption that existing barriers to trade in vegetables will gradually be eliminated.

The potential for producing and exporting more vegetables appears large enough to justify some expansion in existing research, extension and technical assistance programs for vegetable producers.

A few additional investments in marketing facilities for vegetables were recommended in Chapter 8. Existing programs for training specialists in vegetable production and marketing should be expanded.

Any program designed to increase corn production in Guatemala is unlikely to be successful in the long run unless high priority is given to providing storage and drying facilities for handling the increased production. The key to the success of a corn production program will be the government's ability to prevent a substantial decrease in the farm price of corn as production increases. The availability of storage and drying facilities can play an important role in reducing the extent of farm price decreases while at the same time helping to stabilize the retail price of corn. The storage facilities should be available within 18 months after the corn production program gets under way. This is barely enough time for firms to plan and construct storage facilities. Thus, the program to provide corn storage and drying facilities should be assigned a priority equal to that assigned to the production program. The marketing program for corn should initially concentrate on how the storage facilities are to be financed and controlled. Training programs on managing and operating corn storage and drying facilities should then be developed.

The recently proposed warehouse law could play an important role in encouraging private firms to invest in storage facilities. The main technical aspects of such a law have already been worked out. Legislative and administrative action on the law should be finalized by the time new storage facilities are in operation. An official system of corn grades will be needed once the law goes into effect. Introducing grades for corn should be a relatively easy job once the wholesalers

decide that a grading system is needed.

If we limit our attention to fruits, vegetables and corn and distinguish between production programs and marketing programs; the priorities which we would assign at the present time would be:

<u>Program</u>	<u>Priority</u>
Corn Production	1
Corn Marketing	1
Vegetable production	2
Vegetable marketing	2
Fruit production	3
Fruit marketing	4

where (1) denotes top priority, (2) high priority, (3) average priority and (4) low priority.

The priorities which we would assign to a few of the other commodity oriented programs discussed in this report are:

<u>Program</u>	<u>Priority</u>
Fish production	4
Fish marketing (domestic)	3
Beef production	2
Beef marketing	3
Milk production	3
Milk marketing	3

Certain production oriented programs, if undertaken on a large scale, would require some revisions in the priorities listed above. A large pasture improvement program on the south coast, for example, could

create milk marketing problems in some areas. In this case, it would be advisable to assign a high priority (2) to milk marketing projects focused on the south coast area.

It is tempting to argue that marketing programs should receive highest priority because "marketing margins are high while farm prices are low." The implication is that there are more possibilities for reducing marketing costs than for reducing production costs. While this is undoubtedly true in some cases, improvements in the marketing system may in fact increase marketing margins in other cases. A change in the marketing system that provides consumers with products during seasons when the products were not formerly available or results in exporting products not previously exported, for example, may represent a market improvement even though marketing margins are higher. Similarly, providing consumers with higher quality products frequently involves increased marketing costs yet still may be classified as an improvement in the marketing system. (Programs to introduce improved packaging of farm products, for example, may increase both marketing costs and product quality.)

In some cases, the key to reducing marketing margins may well be to concentrate on cultivation and harvesting techniques which result in a better quality and more standardized product being available at the farm gate. Marketing margins for many products will undoubtedly remain high as long as wholesalers find it necessary to deal with large numbers of very small farmers who continue to mix both high and low quality produce in the package which they offer for sale.

We have assigned high priority to many marketing programs, not because we believe they will necessarily lead to lower marketing margins, but because we feel they are necessary to prevent substantial reductions in farm prices if programs to increase production are successful.

9.6. Education, Research and Extension

Progress is being made in improving agricultural education in Guatemala. International loans are supporting expanded higher education facilities at San Carlos and Bārcena and expanded primary and mid-level school systems. Numbers of students will be expanded at all levels. Curricula are being improved. More professional and sub-professional manpower will be available in the near future.

Graduate-level training for the scientists and other skilled technicians needed for agricultural development seems to be neglected. It does not appear feasible to develop this type of training in Guatemala; needs at vocational, high school and undergraduate levels are too pressing to permit the diversion of scarce money and manpower to expensive graduate training. A preferred alternative is an expanded long-range program for sending qualified students to the United States and third countries for training. This training would emphasize Master of Science programs and fully utilize the advantages of institutions such as Turrialba and Chapingo as well as United States universities. These programs usually require about two years to complete. A few students who perform well at the MS level could then be selected for Ph.D. training. This would add about two years to the total program for each Ph.D. candidate.

If it is assumed that each student-year of training costs \$5,000 in total for maintenance, tuition, books, travel and other expenses, a ten-year program could be developed along the following lines. The total outlay for this training would be \$1,240,000 over the ten year period. It would provide 100 students with MS-level training and 24 Ph.D. 's. These

students should be programmed as follows:

<u>Year</u>	<u>Students in Training</u>	
	<u>MS</u>	<u>Ph. D.</u>
1	5	-
2	15	-
3	25	2
4	30	5
5	30	7
6	30	8
7	25	8
8	20	8
9	15	7
10	5	3
No. of Students	100	24
No. of Student Years	200	48

Fields of study should be allocated to include all major areas in which manpower is needed. The following mix is one possibility:

<u>Field</u>	<u>MS Students</u>	<u>Ph. D. Students</u>
Agronomy and Plant Breeding	24	4
Soil Science	12	4
Horticulture	10	2
Animal Science	12	4
Agricultural Economics and Statistics	24	6
Extension, Sociology and Communications	10	2
Agricultural Engineering and Irrigation	8	2
Total	100	24

A major problem will be to effectively utilize this high-level manpower as it becomes available. It does not appear desirable to fully reorganize existing agencies at the present time with existing manpower. Positions of leadership and responsibility should be created as the pool of trained people expands. Giving trained personnel the effective responsibility and necessary budgetary and administrative support to permit them to develop productive programs of research, training and extension should be the goal. Particular attention should be given to the

problem of integrating teaching research and extension activities.

Guatemala is unlikely to be able to mount all the basic and applied research required to support accelerated teaching, extension and development programs. The possibility of cooperating in existing regional and international research programs or organizing new regional centers for basic research should be fully explored. Emphasis in Guatemala should be placed on research for the local adaptation and testing of new knowledge generated in the basic research programs. It should be closely tied to the productivity and programs of new technology for use in the subsistence sector. Only by clarifying the objectives and sharpening the focus of research and extension programs can the levels of funds envisaged in this report be used to obtain high payoffs in terms of growth and development.

9.7. Improving Statistical Data

Frequent reference has been made in this report to the lack or unreliability of the data needed to analyze alternative programs and policies to accelerate agricultural growth and improve the welfare of agricultural producers in Guatemala. A number of good statistical series already exist in Guatemala; some useful ones are just being initiated. Other potentially useful series are needed and many existing ones should be improved as soon as trained personnel and funds can be obtained.⁴

9.7.1. Statistical Time Series

There are several statistical offices in the Ministries of

⁴For an excellent survey of agricultural statistics currently being collected and recommendations for improvement, see J. A. Becher, "A Program of Agricultural Statistics for Guatemala," USAID Report, February, 1966.

Agriculture and Economics that are making important contributions to the collection, tabulation and publication of data on agricultural production and prices in Guatemala. However, none of these offices has sufficient personnel and funds to provide accurate and consistent data on a regular and timely basis. A first step in improving the data would be to clarify which series are most important and which offices have the continuing responsibility for collecting and publishing them. Data on area, production and prices of crops and livestock products in producing areas and markets are an example where several agencies overlap and publication is irregular and often delayed. Such data should be made available to government agencies and the public on a definite established schedule.

The lack of regular publication of reliable statistics by the statistical offices probably explains why many versions of the same data exist in Guatemala. Other government agencies and private groups have frequently been forced to make their own estimates. This has led to a considerable duplication of effort and much confusion over the differences in the alternative estimates. Consolidation and coordination of these activities should result in improvement in the basic information and elimination of much of the inconsistency. We recommend that an integrated interagency effort be undertaken to regularly collect and publish data on crop areas and production, livestock production, prices received and paid by farmers, use of farm inputs, and prices in wholesale, retail and international markets.

9.7.2. Agricultural Census

An agricultural census, if well designed and executed, can give an overall picture of the structure of agriculture and the conditions of

agricultural production units. In addition the census can serve as a benchmark for adjusting many basic statistical series and for supplying data to be used as weights in the construction of various indices.

High priority should be given to the execution for the 1970 Agricultural Census in Guatemala in order to insure that a complete and accurate inventory of farms, people engaged in agriculture, livestock and crop production, and agricultural practices is made. The 1970 census could be invaluable for evaluation of agricultural data for recent years. This latter point is particularly important in view of the uncertainty in Guatemala over the quality of alternative series. Also, much needed information which is not collected on an annual basis could easily be collected at the time of the census. This is especially true for information on farm size, practices, labor supply, income and expenditures.

Emphasis should also be given to the termination of the final tabulations and publication of the 1964 Agricultural Census. At present only a part of the census has been published in final form. Many of the tabulations are still preliminary and only limited use can be made of them. The availability of both the 1964 and 1970 censuses would provide a basis for measuring structural changes occurring in the agricultural sector. Such knowledge is basic to the improved planning and implementation of development programs.

APPENDIX A

TRANSPORTATION, EDUCATION AND EMPLOYMENT STATISTICS

2/82

TABLE A-1
 TRANSPORT TARIFFS FROM SELECTED MUNICIPALITIES
 TO THE CAPITOL (1969)

Municipality	Tariff Per 100 lbs.	Product
Guatemala		
Villa Nueva	0.10	Vegetables and Tobacco
Amatitlah	0.15	Avacados, Beans, Peanuts, Tobacco
Palencia	0.20	Potatoes, Guisquil
San Juan Sacatepequez	0.15	Vegetables and Flowers
Sacatepéquez		
Ciudad Vieja	0.25	Vegetables
Sta. Lucia Milpas Altas	0.15	Vegetables
Antigua	0.20	Vegetables
Sta. Tomás Milpas Altas	0.20	Vegetables
Magdalena Milpas Altas	0.15	Vegetables
Chimaltenango		
Chimaltenango	0.20	Vegetables
Parramos	0.30	Beans
Tecpán	0.35	Potatoes
Comalapa	0.25	Potatoes, Cabbage
Patzún	0.30	Potatoes
Sta. Cruz Balanya	0.30	Potatoes
Escuintla		
Escuintla	0.25	Mangos and Oranges
Escuintla	0.20	Corn, Sesame
Siquinala	0.25	Corn
Sta. Lucia Cotzumalguapa	0.30	Corn and Fruit
Masagua	0.30	Corn and Yuca
Puerto San Jose	0.35	Fish and Moluses
Palín	0.20	Fruit
Suchitepéquez		
Mazetenango	0.30	Pineapple and Oranges
San Miguel Pahán	0.35	Cacao
Parcelamiento-La Maquina	0.50	Corn
San Antonio Suchitepequez	0.30	Cacao
Retalhuleu		
Retalhuleu	0.40	Pineapple
Retalhuleu	0.35	Rice and Corn

TABLE A-1--Continued

Municipality	Tariff Per 100 lbs.	Product
El Progreso		
Progreso	0.20	Zapite and Chico
Progreso	0.20	Tomatoes
Sansare	0.25	Tuquilla
San Agustín Acasaguastlán	0.30	Tomatoes
Huehuetenango		
Aguacatán	0.50	Garlic
Chantla	0.50	Garlic
Izabal		
Morales	0.40	Rice
Morales	0.40	Bananas
Entre Rios	0.40	Pineapple
Chiquimula		
Ipala	0.40	Beans
Esquipulus	0.50	Tobacco
Chiquimula	0.40	Tobacco
Zacapa		
Teculután	0.30	Tomato and Pepino
Rio Honoo	0.35	Tomato and Watermelon
Gualán	0.40	Tomatoes and Oranges
La Unión	0.50	Oranges and Coffee
Usumatlán	0.25	Tomato
Jutiapa		
El Progreso	0.50	Onions and Watermelon
El Progreso	0.40	Rice
Jutiapa	0.35	Corn, Beans, and Sorghum
Asunción Mita	0.40	Corn, Beans, and Tomatoes
Santa Rosa		
Barbarena	0.25	Corn, Coffee, and Beans
San Rafael Las Flores	0.35	Onions
Guazacapán	0.35	Corn and Sesame
Quezaltenango		
Quezaltenango	0.40	Vegetables
Quezaltenango	0.35	Apples
Zunil	0.40	Vegetables
Huitán	0.40	Apples
Sololá		
Santiago Atitlán	0.30	Peaches and Tunas

TABLE A-2
EDUCATION, 1964

Coastal Region	Total	Urban	Rural
Population Total ^a	820,680	215,760	604,920
Population 7 Years or More	616,760	166,840	449,920
Population over 7 Years Which Have not Gone to School	417,780	82,640	335,140
Percentage of Population over 7 Years Which has not Gone to School	67.7	49.5	74.5
Population over 7 Years That Had Finished Primary Education	17,820	11,880	5,940
Percentage of Population over 7 Years that has Finished Primary Education	2.9	7.1	1.3
Population over 7 Years that had Finished Secondary Education	380	300	80
Percentage of Population over 7 Years that had Finished Secondary Education	0.1	0.2	0.0
Population over 7 Years that had Finished University Studies	760	500	260
Percentage of Population over 7 Years that had Finished University Studies	0.1	0.3	0.1

^aDoes not include persons living in Institutions.

Source: Direcccion General de Estadisticas - 1964 Population Census

TABLE A-3
EDUCATION, 1964

Central Region	Total	Urbana	Rural
Population Total ^a	3,361,400	1,204,920	2,156,480
Population 7 Years or More	2,537,780	936,080	1,601,700
Population over 7 Years Which Have not Gone to School	1,720,860	379,660	1,341,200
Percentage of Population over 7 Years Which has not Gone to School	67.8	40.6	83.7
Population over 7 Years that had Finished Primary Education	113,900	103,260	10,640
Percentage of Population over 7 Years that has Finished Primary Education	4.5	11.0	0.7
Population over 7 Years that had Finished Secondary Education	4,880	4,700	180
Percentage of Population over 7 Years that had Finished Secondary Education	0.2	0.5	0.0
Population over 7 Years that had Finished University Studies	13,280	13,000	280
Percentage of Population over 7 Years that had Finished University Studies	0.5	1.4	0.0

Source: Direccion General de Estadisticas - 1964 Population Census

^aDoes not include persons living in Institutions.

TABLE A-4
EDUCATION, 1964

Peten Region	Total	Urbana	Rural
Population Total ^a	27,740	12,340	15,400
Population 7 Years or More	20,360	9,100	11,260
Population over 7 Years Which Have not Gone to School	9,920	3,100	6,820
Percentage of Population over 7 Years Which has not Gone to School	48.7	34.1	60.6
Population over 7 Years that had Finished Primary Education	960	680	280
Percentage of Population over 7 Years that has Finished Primary Education	4.7	7.5	2.5
Population over 7 Years that had Finished Secondary Education	0	0	0
Percentage of Population over 7 Years that had Finished Secondary Education	0	0	0
Population over 7 Years that had Finished University Studies	20	0	20
Percentage of Population over 7 Years that had Finished University Studies	0.1	0	0.2

Source: Direccion General de Estadisticas - 1964 Population Census

^aDoes not include persons living in Institutions.

TABLE A-5
GENERAL LEVEL OF EMPLOYMENT, 1964

Coastal Region	Total	Urban	Rural
Population Total ^a	820,680	215,760	604,920
Population 7 Years or More	616,760	116,840	449,920
Number of Males - 7 Years or More	335,480	81,160	244,320
Number of Females - 7 Years or More	291,280	85,680	205,600
Population 7 Years or More Economically Active	253,020	64,700	188,320
Percentage Population 7 Years or More Economically Active	41.0	38.8	41.9
Number of Males 7 Years or More Economically Active	235,100	53,940	181,160
Percentage of Males 7 Years or More Economically Active	72.2	66.5	74.2
Number of Females 7 Years or More Economically Active	17,920	10,760	7,160
Percentage of Females 7 Years or More Economically Active	6.2	12.6	3.5

Source: Direcccion General de Estadisticas - 1964 Population Census

^aDoes not include persons living in Institutions.

TABLE A-6
GENERAL LEVEL OF EMPLOYMENT, 1964

Central Region	Total	Urban	Rural
Population Total ^a	3,361,400	1,204,920	2,156,480
Population 7 Years or More	2,537,780	936,080	1,601,700
Number of Males - 7 Years or More	1,244,160	434,720	809,440
Number of Females - 7 Years or More	1,293,620	501,360	792,260
Population 7 Years or More Economically Active	1,055,740	393,820	661,920
Percentage Population 7 Years or More Economically Active	41.6	42.1	41.3
Number of Males 7 Years or More Economically Active	907,900	287,760	620,140
Percentage of Males 7 Years or More Economically Active	73.0	66.2	76.6
Number of Females 7 Years or More Economically Active	147,840	106,060	41,780
Percentage of Females 7 Years or More Economically Active	11.4	21.2	5.3

Source: Direccion General de Estadisticas - 1964 Population Census

^aDoes not include persons living in Institutions.

TABLE A-7
GENERAL LEVEL OF EMPLOYMENT, 1964

Peten Region	Total	Urban	Rural
Population Total ^a	27,740	12,340	15,400
Population 7 Years or More	20,360	9,100	11,260
Number of Males - 7 Years or More	10,560	4,420	6,140
Number of Females - 7 Years or More	9,800	4,680	5,120
Population 7 Years or More Economically Active	8,380	3,440	4,940
Percentage Population 7 Years or More Economically Active	41.2	37.8	43.9
Number of Males 7 Years or More Economically Active	7,580	3,020	4,560
Percentage of Males 7 Years or More Economically Active	71.8	68.3	74.3
Number of Females 7 Years or More Economically Active	800	420	380
Percentage of Females 7 Years or More Economically Active	8.2	9.0	7.4

Source: Direccion General de Estadisticas - 1964 Population Census

^aDoes not include persons living in Institutions.

APPENDIX B

TYPE OF FARM MANAGEMENT BY REGION

TABLE B-1

COASTAL REGION: TYPE OF FARM MANAGEMENT (1964)

Farm Size Class	Number of Farms	Owner Operated Farms ^a		Hired Manager Farms	
		Number	Per Cent	Number	Per Cent
Less than 0.70 hectares	19,365	19,282	99.6	83	0.4
From 0.70 to 6.99 hectares	38,423	38,259	99.6	164	0.4
From 6.99 to 45.13 hectares	8,143	7,966	97.8	177	2.2
From 45.13 to 902.51 hectares	2,384	1,467	61.5	917	38.5
More than 902.51 hectares	190	48	25.3	142	74.7
Coastal Region	68,505	67,022	97.8	1,483	2.2

Source: Second Agricultural Census, 1964; Census Bureau, Guatemala.

^aIncludes Renter-Operated Colonos and Collective Farms.

TABLE B-2

CENTRAL REGION: TYPE OF FARM MANAGEMENT (1964)

Farm Size Class	Number of Farms	Owner Operated Farms ^a		Hired Manager Farms	
		Number	Per Cent	Number	Per Cent
Less than 0.70 hectares	65,655	65,534	99.8	121	0.2
From 0.70 to 6.99 hectares	239,387	239,000	99.8	387	0.2
From 6.99 to 45.13 hectares	35,281	35,028	99.3	253	0.7
From 45.13 to 902.51 hectares	6,011	5,125	85.3	886	14.7
More than 902.51 hectares	196	77	39.3	119	60.7
Central Region	346,530	344,764	99.5	1,766	0.5

Source: Second Agricultural Census, 1964; Census Bureau, Guatemala.

^aIncludes Renter-Operated Colonos and Collective Farms.

TABLE B-3

PETEN REGION: TYPE OF FARM MANAGEMENT (1964)

Farm Size Class	Number of Farms	Owner Operated Farms ^a		Hired Manager Farms	
		Number	Per Cent	Number	Per Cent
Less than 0.70 hectares	63	63	100.0	-	-
From 0.70 to 6.99 hectares	1,987	1,987	100.0	-	-
From 6.99 to 45.13 hectares	232	230	99.1	2	0.9
From 45.13 to 902.51 hectares	25	22	88.0	3	12.0
More than 902.51 hectares	2	2	100.0	-	-
Peten Region	2,309	2,304	99.8	5	0.2

Source: Second Agricultural Census, 1964; Census Bureau, Guatemala.

^aIncludes Renter-Operated Colonos and Collective Farms.

APPENDIX C

PRODUCTION, AREA, AND FARM PRACTICE STATISTICS FOR SELECTED AGRICULTURAL PRODUCTS BY SIZE OF FARM AND BY REGION

The tables in this appendix were constructed from the 1964 Agricultural Census data and are included to give the reader an idea of the relative importance of various products not discussed in Chapter 4. A more complete set of these tables will be published shortly by the Ministry of Agriculture and the National Planning Council. The production estimates are generally believed to be low and the reader is advised to use the total production figures presented in Chapter 5 and Appendix D .

TABLE C-1

GUATEMALA: NUMBER OF PRODUCERS OF SINGLE CROP BEANS, AREA, PRODUCTION
AND YIELD, BY SIZE OF FARM

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area (Has.)	Production (Metric Tons)	Yield (Kg/Ha)
Less than 0.70 hectares	1,801	24.9	225	190	844.4
From 0.70 to 6.99 hectares	29,630	39.2	11,021	7,072	641.7
From 6.99 to 45.13 hectares	7,375	48.2	5,388	3,447	639.8
From 45.13 to 902.51 hectares	1,425	51.0	2,677	1,771	661.6
More than 902.51 hectares	35	60.3	179	147	821.2
Guatemala Total	40,266	39.9	19,490	12,627	647.9

Source: Second Agricultural Census, 1964, Census Bureau.

TABLE C-2
 GUATEMALA: PRODUCTION AND YIELD FOR BEANS INTERPLANTED
 WITH OTHER CROPS

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area Interplanted (Has.)	Production (Metric Tons)	Yields (Kg/Ha)
Less than 0.70 hectares	4,961	68.7	1,868	530	284
From 0.70 to 6.99 hectares	39,605	52.3	43,712	10,365	237
From 6.99 to 45.13 hectares	6,662	43.6	14,646	3,083	211
From 45.13 to 902.51 hectares	1,041	37.2	5,166	1,490	288
More than 902.51 hectares	19	32.8	367	127	346
Guatemala Total	52,288	51.7	65,759	15,595	237

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-3

GUATEMALA: NUMBER OF PRODUCERS OF RICE, AREA, PRODUCTION
AND YIELD, BY SIZE OF FARM^a

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area (Has.)	Production (Metric Tons)	Yield (Kg/Ha)
Less than 0.70 hectares	990	24.4	155	367	2,368
From 0.70 to 6.99 hectares	5,858	93.8	2,946	4,450	1,511
From 6.99 to 45.13 hectares	1,899	93.3	2,521	3,682	1,461
From 45.13 to 902.51 hectares	425	95.7	2,025	3,191	1,576
More than 902.51 hectares	15	93.8	1,017	1,345	1,323
Guatemala Total	9,187	71.8	8,664	13,035	1,505

Source: Second Agricultural Census, 1964, Census Bureau.

^aNot including those farms which interplant.

TABLE C-4
 GUATEMALA: PRODUCTION AND YIELDS FOR RICE INTERPLANTED WITH
 OTHER CROPS (1964)

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area Interplanted (Has.)	Production (Metric Tons)	Yields (Kg/Ha)
Less than 0.70 hectares	3,073	75.6	2,405	1,577	656
From 0.70 to 6.99 hectares	386	6.2	390	262	672
From 6.99 to 45.13 hectares	136	6.7	697	208	298
From 45.13 to 902.51 hectares	19	4.3	130	92	708
More than 902.51 hectares	1	6.2	- -	- -	- -
Guatemala Total	3,615	282	3,622	2,139	591

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-5

GUATEMALA: NUMBER OF PRODUCERS OF POTATOES, AREA, PRODUCTION AND YIELD, BY SIZE OF FARM^a

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area (Has.)	Production (Metric Tons)	Yield (Kg/Ha)
Less than 0.70 hectares	1,159	92.5	146	531	3,637
From 0.70 to 6.99 hectares	9,486	95.4	2,034	7,721	3,796
From 6.99 to 45.13 hectares	2,032	95.5	725	2,975	4,103
From 45.13 to 902.51 hectares	198	95.2	166	998	6,012
More than 902.51 hectares	3	100.0	7	35	5,000
Guatemala Total	12,878	95.1	3,078	12,260	3,983

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

^aNot including those farms which interplant.

TABLE C-6
 GUATEMALA: PRODUCTION AND YIELDS FOR POTATOES INTERPLANTED
 WITH OTHER CROPS

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area Interplanted (Has.)	Production (Metric Tons)	Yield (Kg/Ha)
Less than 0.70 hectares	94	7.5	30	46	1,533
From 0.70 to 6.99 hectares	459	4.6	382	774	2,026
From 6.99 to 45.13 hectares	97	4.5	168	201	1,196
From 45.13 to 902.51 hectares	10	4.8	50	86	1,720
More than 902.51 hectares	-	-	-	-	-
Guatemala Total	660	4.9	630	1,107	1,757

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-7
 GUATEMALA: NUMBER OF PRODUCERS OF COTTON, AREA, PRODUCTION
 AND YIELD, BY SIZE OF FARM^a

Farm Size Class	Number of Farms	Per Cent of Producers using Practice	Area (Has.)	Production (Metric Tons)	Yield (Kg/Ha)
Less than 0.70 hectares	12	100.0	- -	2	- -
From 0.70 to 6.99 hectares	86	100.0	66	85	1,288
From 6.99 to 45.13 hectares	172	99.4	1,405	3,492	2,485
From 45.13 to 902.51 hectares	274	100.0	51,458	103,512	2,012
More than 902.51 hectares	45	100.0	32,500	65,139	2,004
Guatemala Total	589	99.8	85,429	172,230	2,016

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

^aDoes not include those farms which interplant.

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TABLE C-8

GUATEMALA: NUMBER OF PRODUCERS OF COFFEE, AREA, PRODUCTION AND
YIELD, BY SIZE OF FARM

Farm Size Class	Number of Farms	Area Devoted to Coffee (Has)	Area In Production (Has)	Production (Metric Tons)	Yield (Kg/Ha)
Less than 0.70 hectares	9,945	2,155	1,893	3,789	2,002
From 0.70 to 6.99 hectares	42,427	25,251	21,302	40,437	1,898
From 6.99 to 45.13 hectares	9,526	22,661	19,151	41,202	2,151
From 45.13 to 902.51 hectares	3,343	132,232	118,486	380,970	3,215
More than 902.51 hectares	250	49,348	43,851	213,136	4,860
Guatemala Total	65,491	231,647	204,683	679,534	3,320

Source: Dirección General de Estadística.

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TABLE C-9
 GUATEMALA: NUMBER OF PRODUCERS OF BANANAS, AREA, PRODUCTION
 AND YIELD BY SIZE OF FARM

Farm Size Class	Number of Farms	Area Devoted to Bananas (Has)	Area in Production (Has)	Production (Bunches)	Yield (Bunches/ Ha)
Less than 0.70 hectares	670	51.0	43.3	23,509	549
From 0.70 to 6.99 hectares	5,334	1,056.5	930.7	304,894	328
From 6.99 to 45.13 hectares	1,478	654.7	563.2	170,991	304
From 45.13 to 902.51 hectares	388	640.1	568.8	149,337	263
More than 902.51 hectares	11	7,525.4	4,528.5	5,219,151	1,153
Guatemala Total	7,881	9,927.7	6,634.5	5,867,882	884

Source: Dirección General de Estadística.

TABLE C-10

GUATEMALA: NUMBER OF PRODUCERS OF SUGAR CANE AND AREA

Farm Size Class	Number of Farms	Area Devoted to Sugar Cane (Has)	Area in Production (Has)
Less than 0.70 hectares	1,361	174.7	163.5
From 0.70 to 6.99 hectares	18,244	4,688.5	4,159.6
From 6.99 to 45.13 hectares	5,399	5,678.6	5,028.1
From 45.13 to 902.51 hectares	1,611	18,692.7	16,896.2
More than 902.51 hectares	59	12,343.9	11,834.5
Guatemala Total	26,674	41,578.4	38,081.9

Source: Second Agricultural Census, 1964 - Dirección General de Estadística.

TABLE C-11

GUATEMALA: NUMBER OF FARMERS PRODUCING WHEAT AND AREA PLANTED TO WHEAT, BY DEPARTMENT AND REGION (1964)

Department	Number of Farms	Per Cent of Farms	Area Planted to Wheat (hectares)	Per Cent of Area Cropped
Coastal Region	71	0.1	39.2	0.0
Escuintla	5	0.0	5.6	0.0
Santa Rosa	37	0.2	21.0	0.1
Suchitepequez	7	0.0	1.4	0.0
Retalhuleu	8	0.1	0.0	0.0
Izabal	14	0.2	11.2	0.1
Central Region	32,953	9.5	23,026.3	4.8
Guatemala	9	0.1	3.5	0.0
El Progreso	6	0.1	3.5	0.0
Sacatepequez	8	0.1	30.7	0.3
Chimaltenango	3,008	14.2	3,054.2	9.3
Solola	2,105	13.4	1,462.5	11.3
Totonicapan	6,833	30.1	3,444.8	24.6
Quezaltenango	8,269	31.8	7,031.4	26.0
San Marcos	7,791	19.2	4,862.5	11.8
Huehuetenango	4,060	9.7	2,494.5	4.1
El Quiche	671	1.8	420.6	0.8
Baja Verapaz	8	0.1	4.2	0.0
Alta Verapaz	20	0.1	2.8	0.0
Zacapa	16	0.2	7.7	0.1
Chiquimula	31	0.2	18.9	0.1
Jalapa	55	0.4	127.2	0.5
Jutiapa	63	0.3	57.3	0.1
Peten Region	2	0.1	0.0	0.0
Guatemala Total	33,026	7.9	23,065.5	3.4

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-12

GUATEMALA: NUMBER OF FARMERS PRODUCING RICE AND AREA
PLANTED TO RICE, BY DEPARTMENT AND REGION (1964)

Department	Number of Farms	Per Cent of Farms	Area Planted to Rice (hectares)	Per Cent of Area Cropped
Coastal Region	5,083	7.4	5,346.0	2.9
Escuintla	494	2.9	927.2	1.1
Santa Rosa	1,080	6.0	1,040.4	4.1
Suchitepequez	1,417	9.2	723.9	3.2
Retalhuleu	1,037	9.8	518.5	1.3
Izabal	1,055	14.9	2,136.0	13.8
Central Region	7,657	2.2	6,905.7	1.4
Guatemala	10	0.1	15.4	0.1
El Progreso	10	0.1	7.0	0.1
Sacatepequez	-	-	-	-
Chimaitenango	7	0.0	8.4	0.0
Solola	11	0.1	2.1	0.0
Totonicapan	8	0.0	4.2	0.0
Quezaltenango	601	2.3	181.7	0.7
San Marcos	1,022	2.5	259.2	0.6
Huehuetenango	9	0.0	5.6	0.0
El Quiche	11	0.0	7.7	0.0
Baja Verapaz	48	0.3	37.0	0.1
Alta Verapaz	3,099	8.4	3,391.0	5.4
Zacapa	239	3.3	125.1	0.8
Chiquimula	570	3.3	367.5	1.5
Jalapa	80	0.6	80.4	0.3
Jutiapa	1,932	9.0	2,413.4	5.8
Peten Region	62	2.7	11.2	0.2
Guatemala Total	12,802	3.1	12,262.9	1.8

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-13

GUATEMALA: NUMBER OF FARMERS PRODUCING POTATOES AND AREA PLANTED TO POTATOES, BY DEPARTMENT AND REGION (1964)

Department	Number of Farms	Per Cent of Farms	Area Planted to Potatoes (hectares)	Per Cent of Area Cropped
Coastal Region	495	0.7	250.9	0.1
Escuintla	2	0.0	0.7	0.0
Santa Rosa	491	2.7	248.8	1.0
Suchitepequez	1	0.0	0.7	0.0
Retalhuleu	-	-	-	-
Izabal	1	0.0	0.7	0.0
Central Region	13,043	3.8	3,449.7	0.7
Guatemala	430	2.5	147.4	0.6
El Progreso	22	0.3	5.6	0.0
Sacatepequez	31	0.4	12.6	0.1
Chimaltenango	475	2.2	265.5	0.8
Solola	286	1.5	30.7	0.2
Totonicapan	298	1.3	35.6	0.3
Quezaltenango	1,494	5.7	357.1	1.3
San Marcos	5,959	14.7	1,092.8	2.7
Huchuetenango	3,314	8.0	1,042.5	1.7
El Quiche	237	0.6	138.4	0.3
Baja Verapaz	22	0.1	7.0	0.0
Alta Verapaz	38	0.1	4.9	0.0
Zacapa	4	0.1	4.9	0.0
Chiquimula	4	0.0	-	-
Jalapa	131	1.0	63.6	0.3
Jutiapa	298	1.4	241.1	0.6
Peten Region	-	-	-	-
Guatemala Total	13,538	3.2	3,700.6	0.5

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-14

GUATEMALA: NUMBER OF FARMERS PRODUCING COTTON AND AREA PLANTED TO COTTON, BY DEPARTMENT AND REGION (1964)

Department	Number of Farms	Per Cent of Farms	Area Planted to Cotton (hectares)	Per Cent of Area Cropped
Coastal Region	542	0.8	81,025.0	43.4
Escuintla	229	1.3	51,670.3	61.0
Santa Rosa	7	0.0	603.0	2.4
Suchitepequez	134	0.9	8,102.6	36.0
Retalhuleu	172	1.6	20,649.1	53.4
Izabal	-	-	-	-
Central Region	48	0.0	4,251.9	0.9
Guatemala	-	-	-	-
El Progreso	-	-	-	-
Sacatepequez	-	-	-	-
Chimaltenango	-	-	-	-
Solola	-	-	-	-
Totonicapan	-	-	-	-
Quezaltenango	10	0.0	788.9	2.9
San Marcos	24	0.1	3,423.1	8.3
Huehuetenango	-	-	-	-
El Quiche	-	-	-	-
Baja Verapaz	-	-	-	-
Alta Verapaz	-	-	-	-
Zacapa	1	0.0	12.6	0.1
Chiquimula	7	0.0	23.1	0.1
Jalapa	2	0.0	2.1	0.0
Jutiapa	4	0.0	2.1	0.0
Peten Region	-	-	-	-
Guatemala Total	590	0.1	85,276.9	12.6

Source: Second Agricultural Census, 1964, Census Bureau, Guatemala.

TABLE C-15
NUMBER OF CATTLE SLAUGHTERED BY ZONE (1967)

Zone	Number of Cattle	Value in Quetzales	New Weight in Kilos	
			Meat and Bone	By-Products
1. Central Zone: Guatemala Sacatepéquez Chimaltenango	106,288	9,782,351	18,059,876	2,071,242
2. South Zone Escuintla Suchitepéquez Retalhuleu	19,629	1,316,163	2,972,658	298,770
3. Western Zone Quezaltenango San Marcos	6,256	424,457	929,246	96,232
4. Middle West Zone Sololá Totonicapán	24,871	2,114,171	4,196,396	458,942
5. Northwest Zone Huehuetenango El Quiché	13,703	1,046,871	2,140,058	222,180
6. North Zone Alta Verapaz Petén Izabal	12,827	794,570	1,652,872	174,340
7. Northeast Zone El Progreso Baja Verapaz Zacapa	14,593	839,607	1,950,124	174,386
8. Eastern Zone Chiquimula Jalapa	5,671	313,315	670,082	69,598
9. Southeast Zone Santa Rosa Jutiapa	5,460	342,097	685,814	72,542
TOTAL	209,298	16,973,602	33,257,126	3,642,786

Source: Dirección General de Estadística.

APPENDIX D
ANNUAL PRODUCTION SERIES FOR SELECTED
AGRICULTURAL PRODUCTS

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TABLE D-1
COFFEE

Year	Production (1000 M. T.)	Area (Hectares)	Yield Kilos/Hectare	Exports ^a (MT.)
1950	6,768.0	127,069	532.6	54,832
1951	6,322.2			50,094
1952	7,389.4	141,330	522.8	61,042
1953	7,060.1			56,580
1954	6,724.3	151,610	443.5	52,118
1955	7,415.7			59,156
1956	7,865.5	173,390	453.6	63,204
1957	7,835.2			61,732
1958	8,895.5	194,810	456.6	71,351
1959	10,285.6			82,961
1960	10,223.0	216,230	472.9	79,920
1961	9,987.1			79,010
1962	10,302.6	237,650	433.5	82,396
1963	12,015.7			98,237
1964	11,412.1			76,051
1965	12,281.5			95,282
1966	12,228.2			109,034
1967	8,379.5	179,646.1	466.4	81,295
1968				

Source: Consejo Nacional de Planificación.

^aBank of Guatemala.

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TABLE D-2

SUGAR

Year	Production (MT)	Imports ^a (MT)	Exports (MT)
1957		373.8	1,365.7
1958			50.6
1959		495.5	533.6
1960	68,967.0	625.7	680.8
1961	90,893.0	838.8	6,955.2
1962	119,116.0	939.6	31,033.0
1963	134,019.0	1,128.5	46,674.0
1964	150,314.0	1,129.9	54,864.8
1965	138,340.0	1,375.3	31,587.3
1966	164,152.0	785.4	52,268.4
1967	170,858.0		60,918.2

Source: Anuarid de Comercio Exterio; Bank of Guatemala - Boletin Estadistico.

^aRefined and Unrefined.

TABLE D-3
COTTON (PROCESSED)

Year	Production (MT)	Area (Hectares)	Area (Kg/Ha)	Importation (MT)	Exportation ^a (MT)
1950	690	1,750	394.3		
1951	1,242	2,870	432.8		
1952	2,631	8,470	310.6		
1953	4,319	9,660	447.1		
1954	6,638	12,530	529.8		
1955	8,501	17,500	485.8		
1956	9,738	18,970	513.3		7,857
1957	11,127	14,280	779.2		7,227
1958	14,536	20,440	711.1		9,968
1959	15,829	24,850	637.0		10,419
1960	16,427	19,950	823.4		12,446
1961	22,052	31,150	707.9	34	19,559
1962	33,460			25	27,015
1963	56,272				50,416
1964	66,185				64,079
1965	74,032			0.2	70,593
1966	85,965				92,800
1967	73,427	89,829	817.4	45	67,052
1968					

Source: Consejo Nacional de Planificacion - taken from Banco de Guatemala.

^aBank of Guatemala - Buletin Estadistico.

TABLE D-4
COTTON SEED

Year	Exports (MT)*	Imports (MT)**	Authorized Area For Planting (Hectares)
1952		2, 494	
1953		1, 533	
1954		3, 949	
1955		4, 456	
1956	46, 736	2, 462	
1957	33, 258	2, 515	
1958	14, 030	-	
1959	12, 742	1, 739	
1960	95, 588	3, 120	257, 366
1961	28, 520	4, 861	472, 258
1962	34, 283	7, 769	723, 574
1963	224, 199	8, 038	910, 986
1964	106, 890	12, 525	1, 008, 769
1965	127, 183	8, 956	1, 062, 562
1966 ^a	96, 933	9, 183	794, 981
1967 ^a	18, 718	7, 708	-
1968			

Source: *Boletín Estadístico Banco de Guatemala.

**Dirección General de Estadística-Anuario de Comercio Exterior.

^aPreliminary.

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TABLE D-5
BANANAS

Year	Production* (Bunches)	Exportation** (Bunches)
1950	9,422,182	6,938,786
1951	7,186,897	5,264,831
1952	5,376,078	3,907,836
1953	9,724,721	7,155,516
1954	8,632,170	6,335,141
1955	7,250,194	5,298,398
1956	7,172,592	5,237,136
1957	7,239,260	5,283,142
1958	6,112,388	4,701,944
1959	6,917,400	5,451,596
1960	8,777,229	7,253,569
1961	8,001,802	6,291,953
1962	5,759,084	3,630,491
1963	7,005,102	5,308,570
1964	6,154,889	4,139,364
1965	3,435,450	1,510,340
1966	5,461,180	-
1967		-

Source: *Consejo Nacional de Planificacion.
**Guatemala en Cifras, 1965, D. G. E.

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APPENDIX E
MONTHLY WHOLESALE PRICES FOR SELECTED
AGRICULTURAL PRODUCTS

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TABLE E-1
WHOLESALE PRICES OF EGGS

Month	Medium White		Extra Large White	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/360	Q/360	Q/360	Q/360
January	15.62	13.81	16.75	15.43
February	13.90	11.94	15.60	14.17
March	9.87	11.77	12.50	14.01
April	12.68	12.23	14.69	14.19
May	12.87	11.29	14.87	13.72
June	12.68	11.24	14.68	13.50
July	13.60	12.04	15.10	13.95
August	14.75	12.69	16.25	15.08
September	15.25	13.46	16.93	15.18
October	15.20	13.67	16.75	15.54
November	14.75	14.00	16.43	15.77
December	- -	14.28	- -	15.69

Source: Direccion General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-2

WHOLESALE PRICES FOR TOMATOES AND SUGAR BEETS

Month	Plum Tomatoes ¹		Sugar Beets	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/22.5/Kgs.	Q/22.5/Kgs.	Q/34 Kgs.	Q/34 Kgs.
January	2.42	2.26	2.05	1.96
February	2.10	1.54	2.22	2.05
March	1.71	1.56	2.50	2.13
April	1.38	1.52	2.74	2.03
May	1.39	2.09	2.67	2.06
June	5.63	3.19	2.70	2.30
July	5.88	4.55	2.50	2.26
August	3.56	2.69	2.27	2.13
September	1.71	1.83	1.64	2.02
October	1.64	2.92	1.77	2.00
November	2.43	3.15	2.11	2.10
December	--	2.10	--	2.09

Source: Dirección General de Mercadeo Agropecuario. Whole sale prices are for the Terminal Market in Guatemala City.

¹Tomate Ciruela

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TABLE E-3

WHOLESALE PRICES FOR CABBAGE AND LETTUCE

Month	Cabbage (White)		Head Lettuce	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/41 Kgs.	Q/41 Kgs.	Q/20 Kgs.	Q/20 Kgs.
January	1.40	1.55	0.71	0.92
February	2.13	1.87	0.80	1.10
March	2.49	1.98	1.23	1.20
April	2.43	1.73	1.01	1.10
May	2.23	1.71	0.82	1.00
June	2.10	1.60	0.61	0.92
July	1.67	1.22	0.63	0.75
August	0.90	1.03	0.52	0.66
September	0.84	1.06	0.58	0.70
October	0.96	1.08	0.54	0.70
November	1.55	1.32	0.58	0.69
December	--	1.38	--	0.82

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-4

WHOLESALE PRICES FOR CARROTS AND CUCUMBERS

Month	Carrots		Cucumbers	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/30 Kgs.	Q/30 Kgs.	Q/20 Kgs.	Q/20 Kgs.
January	2.08	2.20	1.88	1.62
February	2.07	2.09	0.92	1.32
March	2.42	2.26	1.43	1.40
April	2.23	1.61	1.41	1.10
May	2.45	1.85	1.24	1.10
June	2.33	1.84	1.11	1.15
July	2.51	1.86	0.69	0.60
August	2.32	2.16	0.64	0.78
September	2.15	2.15	0.50	0.84
October	1.72	2.11	0.86	0.92
November	1.69	2.63	1.29	1.31
December	--	2.39	--	1.19

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

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TABLE E-5

WHOLESALE PRICES FOR ONIONS AND PEPPERS

Month	Onions (Average Size)		Ripe Chile Peppers	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/1000	Q/1000	Q/12 Kgs.	Q/12 Kgs.
January	3.76	4.96	1.99	2.48
February	5.28	4.96	2.44	2.77
March	11.82	6.68	1.66	2.19
April	10.15	5.97	2.41	1.81
May	9.87	5.86	2.36	2.09
June	10.18	6.82	3.07	2.83
July	7.99	6.82	3.96	3.29
August	3.75	5.46	2.91	2.67
September	5.54	4.80	2.77	1.64
October	7.85	6.34	3.91	3.00
November	9.82	6.89	3.24	3.10
December	--	5.10	--	2.59

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-6

WHOLESALE PRICES FOR CELERY AND CAULIFLOWER

Month	Celery		Cauliflower (Large)	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/1200	Q/1200	Q/32 Kgs.	Q/32 Kgs.
January	8.74	8.83	1.32	1.28
February	9.25	9.02	1.99	1.56
March	14.87	13.81	2.04	1.73
April	15.34	11.97	2.02	1.66
May	13.66	12.41	2.37	1.77
June	12.44	11.78	2.15	1.74
July	14.53	10.97	1.73	1.49
August	9.90	8.62	1.67	1.50
September	8.81	8.13	1.14	1.37
October	12.17	9.59	1.21	1.45
November	14.12	9.73	1.71	1.61
December	- -	8.49	--	1.41

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-7
WHOLESALE PRICES FOR WHITE CORN

Month	1966 Q/MT	1967 Q/MT	1968 Q/MT	Average 1966-1968 Q/MT
January	74	73	92	80
February	76	78	100	82
March	84	87	105	92
April	84	97	111	97
May	82	96	107	95
June	73	113	106	97
July	67	110	102	93
August	57	102	92	84
September	53	100	76	76
October	56	93	74	74
November	64	96	--	80
December	67	96	--	81

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-8
WHOLESALE PRICES OF YELLOW CORN

Month	1966 Q/MT	1967 Q/MT	1968 Q/MT	1966-1968 Average Q/MT
January	76	73	92	80
February	76	79	91	79
March	84	82	100	88
April	84	93	108	95
May	85	89	101	92
June	75	109	106	96
July	70	110	103	102
August	59	103	95	86
September	55	100	76	77
October	56	90	73	73
November	64	96	--	80
December	67	96	--	81

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-9

WHOLESALE PRICES FOR PLATANO AND PINEAPPLE

Month	Platano (Large)		Pineapple	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/100	Q/100	Q/12	Q/12
January	2.28	2.27	1.75	1.34
February	2.26	2.35	1.88	1.39
March	2.40	2.34	1.90	1.34
April	2.45	2.42	1.62	1.28
May	2.45	2.44	2.05	1.47
June	2.55	2.59	--	1.13
July	2.48	2.59	1.39	1.08
August	2.59	2.63	1.10	1.16
September	2.59	2.58	1.24	1.20
October	--	2.52	--	1.47
November	--	2.40	--	1.31
December	--	2.29	--	1.53

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

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TABLE E-10
WHOLESALE PRICES FOR SESAME SEED AND BARLEY

Month	Sesame Seed (White)		Barley	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/MT	Q/MT	Q/MT	Q/MT
January	161	177	211	165
February	170	173	167	150
March	167	178	156	142
April	161	178	144	139
May	175	187	148	144
June	178	213	144	143
July	181	215	147	143
August	188	214	152	143
September	188	184	163	150
October	189	181	150	165
November	188	196	--	171
December	--	185	--	168

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

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TABLE E-11
 WHOLESALe PRICES FOR BEANS
 (Average Prices for 1966-1968)

Month	White Beans Q/MT	Red Beans Q/MT	Black Beans Q/MT
January	184	183	162
February	182	190	167
March	196	194	181
April	195	197	185
May	197	208	183
June	208	221	195
July	213	234	201
August	188	211	186
September	178	198	190
October	215	216	212
November	195	207	187
December	181	180	168

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

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TABLE E-12
 WHOLESALe PRICES FOR CHICK-PEAS, LENTILES AND
 SORGHUM
 (Average Prices for 1966-1968)

Month	Chick-Pea Q/MT	Lentil Q/MT	Sorghum Q/MT
January	311	489	61
February	229	382	60
March	224	344	61
April	238	396	66
May	268	419	69
June	287	429	72
July	284	446	74
August	278	446	70
September	284	464	82
October	322	464	76
November	346	466	72
December	333	433	69

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-13
 WHOLESAL E PRICES FOR RICE
 (Average Prices for 1966-1968)

Month	Rice 1st Class Q/MT	Rice 2nd Class Q/MT	Rice Cracked ¹ Q/MT
January	246	224	190
February	252	228	178
March	262	237	185
April	269	245	194
May	269	245	201
June	276	253	158
July	274	253	166
August	258	233	180
September	252	225	182
October	233	204	154
November	227	202	148
December	225	203	153

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

¹ Arroz Perla

TABLE E-14

WHOLESALE PRICES FOR LEMON AND PAPAYA

Month	Lemon		Papaya	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/100	Q/100	Q/12	Q/12
January	0.89	1.05	1.03	0.94
February	1.05	0.95	1.09	1.03
March	1.02	0.98	1.15	1.02
April	0.51	0.43	1.25	1.20
May	0.28	0.24	1.15	1.19
June	0.19	0.15	0.97	1.14
July	0.17	0.14	1.04	1.00
August	0.16	0.17	1.24	1.33
September	0.21	0.22	1.53	1.30
October	--	0.21	--	1.28
November	--	0.26	--	1.29
December	--	0.72	--	1.38

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-15
WHOLESALE PRICES FOR AVOCADOS AND PEACHES

Month	Avocado (Average Size)		Peaches (White)	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/100	Q/100	Q/100	Q/100
January	1.28	1.14	--	--
February	1.29	1.08	--	--
March	1.33	1.16	--	--
April	1.34	1.12	--	--
May	1.38	1.13	0.85	0.77
June	1.49	1.26	0.80	0.81
July	2.21	1.60	0.50	0.54
August	3.92	2.29	0.40	0.46
September	4.19	2.25	0.42	0.46
October	3.05	1.83	--	0.37
November	--	1.24	--	--
December	--	1.25	--	--

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

TABLE E-16
WHOLESALE PRICES OF ORANGES

Month	Oranges (Sweet)		Oranges (Juice)	
	1968	1966-1968 Average	1968	1966-1968 Average
	Q/100	Q/100	Q/100	Q/100
January	1.15	1.09	0.68	0.68
February	1.31	1.22	0.69	0.75
March	1.45	1.48	1.15	1.20
April	1.85	1.63	1.25	1.27
May	2.37	2.12	1.15	1.26
June	--	1.83	0.97	1.24
July	1.60	1.69	1.04	1.22
August	1.91	1.56	1.24	1.10
September	1.33	1.23	1.53	0.96
October	1.11	0.96	--	0.50
November	--	0.94	--	0.53
December	--	0.90	--	0.58

Source: Dirección General de Mercadeo Agropecuario. Wholesale prices are for the Terminal Market in Guatemala City.

APPENDIX F

SUMMARY OF PRINCIPAL CROP, LIVESTOCK AND IRRIGATION PROJECTS OF THE MINISTRY OF AGRICULTURE

The tables presented in this appendix were constructed by the National Planning Council and give some idea of the major projects under consideration by the Guatemala government for the development of the agricultural sector. More detailed information covering each of these projects is available in a series of publications done by the Ministry of Agriculture. Unfortunately the analyses and data contained in these reports is sketchy, and they do not provide adequate criteria upon which to formulate judgements as to which projects should be given priority. It is felt that various of these projects merit more in depth analysis to determine the actual costs and benefits that could be expected and to determine the most optimal scale of undertaking. The projects selected for further study should correspond closely with the goals and objectives mentioned in Chapter 9.

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TABLE F-1

GUATEMALA: SUMMARY OF PRINCIPAL CROP AND LIVESTOCK PROJECTS OF THE
MINISTRY OF AGRICULTURE (FEBRUARY 1969)

Project	Date of Initiation	Area Involved in the Project		Total Cost Estimate (Thousands of Q)		Expected New Employment Creation
		New Land	Land on Which Production is to be Improved	New Areas	Improved Areas	
I. Crop and Other Plants						
Citrus Fruits	1968	10,000	-	13,964.5	-	15,000
Avacado	1969	3,000	-	4,300.0	-	1,344
Flowers	1969	205	-	1,395.6	-	14,663
Sesame Seed	1966	11,600	-	1,667.3	-	NA
Platanos	1967	2,000	-	2,461.1	-	809
Deciduous Fruits	1970	1,540	-	3,306.7	-	1,000
II. Livestock and Fish						
Cattle Projection in La Maquina	1970	-	14,000	-	3,927.4	4,000
Fresh Water Fish	1968	400	-	160.9	-	42

Source: Consejo Nacional de Planificacion.

^aEstimated by National Planning Council.

TABLE F-1--Continued

Project	Expected Annual Projection When Project is Completed			Yields Per Hectare	Production Available for Internal Consumption Per Year	Production Available for Exportation per Year
	New Area	Improved Area	Total			
I. Crop and Other Plants						
Citrus Fruits	360,000 TM	-	360,000 TM	360 TM/Ha	50,000 TM	310,000 TM
Avacado	36,000 TM	-	36,000 TM	19.1 TM/Ha	30,227 ^a TM	5,773 TM
Flowers	8,214,550 Da.	-	8,214,550 TM	40,071 De/Ha	246,300 De.	5,751,550 De.
Sesame Seed	26,211 TM	-	26,211 TM	2.3 TM/Ha	23,911 TM	2,300 TM
Platanos	58,500 TM	-	58,500 TM	29.2 TM/Ha	9,400 TM	49,100 TM
Deciduous Fruits	19,096 TM	-	19,096 TM	12.4 TM/Ha	9,568 TM	9,528 TM
II. Livestock and Fish						
Cattle Projection in La Maquina	-	10,000 Head	10,000 Head	1 Head/Ha	9,000 Head	-
Fresh Water Fish	725 TM	-	725 TM	1.8 TM/Ha	725 TM	-

Source: Consejo Nacional de Planificac ion.

^aEstimated by National Planning Council.

TABLE F-2

GUATEMALA: SUMMARY OF MAJOR IRRIGATION PROJECTS OF THE
MINISTRY OF AGRICULTURE (FEBRUARY 1969)

Project	Date of Initiation	Land for Improved Production	Total Cost Estimate (10000) Improved Areas	Expected New Employment Creation	Expected Annual Production When Project is Completed
					Improved Areas
1. Small Irrigation Projects ^a	-	11,348	9,220.0	2,350	101,150 TM
Basic Foods	-	2,758	-	-	7,171 TM
Vegetables	-	5,787	-	-	68,865 TM
Tobacco	-	1,589	-	-	3,019 TM
Others	-	1,214	-	-	22,095 TM
2. Large Irrigation Projects	1970	6,900	6,414.6	7,628	64,157 TM
a. La Fragua	1969	4,500	4,091.0	7,200	-
Basic Foods	-	-	-	-	-
Vegetables	-	612	-	-	11,628 TM
Tobacco	-	234	-	-	6,692 TM
Others	-	3,654	-	-	38,367 TM
b. Salama-San Jeronimo ^b	-	1,200	1,416.6	214	-
Basic Foods	-	1,120	-	-	2,405 TM
Vegetables	-	-	-	-	-
Tobacco	-	-	-	-	-
Others	-	70	-	-	1,330
Livestock	-	10	-	-	50 C
c. Asuncion Mita ^b	1968	1,200	907.0	214	-
Basic Foods	-	-	-	-	-
Vegetables	-	1,120	-	-	2,405 TM
Tobacco	-	-	-	-	-
Others	-	70	-	-	1,330 TM
Livestock	-	-	-	-	-

TABLE F-2--Continued

Project	Yields Per Hectare	Production Available for Internal Consumption per Year	Production Available for Exportation per Year
1. Small Irrigation Projects ^a	-	77,213 TM	27,937 TM
Basic Foods	1.23 TM/Ha.	-	-
Vegetables	11.90 TM/Ha.	-	-
Tobacco	1.90 TM/Ha.	-	-
Others	18.90 TM/Ha.	-	-
2. Large Irrigation Projects	-	52,819 TM	11,338 TM
a. La Fragua	-	-	-
Basic Foods	-	-	-
Vegetables	19.00 TM/Ha.	9,302 TM	2,326 TM
Tobacco	28.60 TM/Ha.	5,353 TM	1,339 TM
Others	10.50 TM/Ha.	30,694 TM	7,773 TM
b. Salama-San Jeronimo ^b	-	-	-
Basic Foods	2.00 TM/Ha.	2,405 TM	-
Vegetables	19.00 TM/Ha.	-	-
Tobacco	-	1,330 TM	-
Others	-	-	-
Livestock	-	-	-
c. Asuncion Mita ^b	-	-	-
Basic Foods	-	-	-
Vegetables	2.00 TM/Ha.	2,505 TM	-
Tobacco	-	-	-
Others	19.00 TM/Ha.	1,330 TM	-
Livestock	-	-	-

Source: Consejo Nacional de Planificacion.

^aComprises 28 small irrigation projects in various parts of Guatemala.

^bProduction and yield figures were estimated by the National Planning Council.